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Feasibility Report  
Water Resources Development  
New Hampshire

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# Winnepesaukee River Basin

September 1985



**US Army Corps  
of Engineers**  
New England Division

## SYLLABUS

This study was initiated by Congressional resolution in 1970. It investigates a variety of flood control measures to reduce recurring flood losses within the Winnepesaukee River Basin in central New Hampshire.

Flooding occurred most recently when prolonged rainfall during 28 May through 2 June 1984 caused the already full Lake Winnepesaukee to rise another 17 inches to a record height damaging docks, marinas, and lake-front properties. Recreational use of the lake was restricted for most of June. Flood flows along the Winnepesaukee River were the greatest ever recorded during this event and caused severe damage to riverfront properties in the communities of Laconia, Tilton, and Franklin. The frequency of the June event was estimated at 2 percent (once in 50 years) based on flows of 4,600 cfs recorded at the U.S. Geological Survey gage in Tilton. If a flood having a 1 percent frequency (once in 100 years) were to occur during the height of the recreation season and accompanied by wind and waves, damages are estimated to reach \$36 million.

Recent study efforts have concentrated on developing a comprehensive plan of flood loss reduction that is economical, publicly acceptable, and compatible with other water related resources in the basin. This report recommends a basin plan which involves modification of the present regulation of Lake Winnepesaukee in conjunction with a system of channel improvements and floodproofing measures along flood prone areas of the Winnepesaukee River. Implementation of this plan will allow greater regulation of water levels in Lake Winnepesaukee and flows along the Winnepesaukee River to achieve a better balance between recreation, hydropower, and flood control needs in the basin.

The total estimated first cost of the selected plan is \$5,540,000. All costs contained in this report are expressed at a March 1985 price level. Comparison of the annual cost of this plan (\$498,700) with the annual benefits (\$3,639,700) yields a benefit-to-cost ratio of 7.3 to 1. Operation and maintenance of the project after its completion would be the responsibility of the State of New Hampshire and is currently estimated at \$5,000 annually.

As a result of the June 1984 flood, State and local officials have stressed the need for immediate action. To expedite project approval and implementation of flood loss reduction measures, this project was submitted for authorization under Section 205 of the Continuing Authorities Program. This approach was endorsed by the State of New Hampshire.

Feasibility studies concluded that aside from the flood loss reduction measures being proposed under Section 205, there are no other water resource problems or opportunities which warrant Corps planning or implementation at this time. Since further Congressional authority is not required under Section 205, this report recommends that the Congressional resolution be closed.

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## I. INTRODUCTION

The Winnepesaukee River Basin is situated in the Lakes Region of north-central New Hampshire. Its series of lakes and connecting waterways has attracted increasing numbers of people for recreational purposes with continued growth anticipated. The shoreline of the lakes and rivers are built up with summer and winter homes, cottages, motels, condominiums, and retail stores. Their close proximity to the waterfront makes them ideal for year-round water oriented recreation, however, it has also created the potential for major flood damages.

The New Hampshire Water Resources Board (NHWRB) owns and operates three dams along the Winnepesaukee River and is responsible for regulating lake levels, meeting downstream release requirements, and minimizing flood damages. Whenever high lake or river stages occur, damages result and the NHWRB receives complaints and calls of concern from local residents. Realizing the potential of major flood damages, the NHWRB has requested that Congress authorize the Corps of Engineers to study the river basin and determine if there is a feasible solution to the flood problem.

As a result of severe flooding that occurred during the spring of 1953 and 1954, the NHWRB requested the Corps to initiate an investigation to develop a plan that would alleviate or reduce the risk of future flood losses. The Corps completed this study in 1957 and concluded that improvements were not economically justified. Since then continued development within the river basin has increased the potential of major flood damages.

In 1970, State and local interests requested the Corps update its earlier study because of the increase in damage potential and continuing local concern. The Corps held a public meeting with local interests in 1972, identified problems, and prepared a Plan of Survey Report to outline general information and study procedures. The lack of additional funding appropriations by Congress prevented further studies. With State and local interests again expressing concern and requesting study continuation, the Corps received funds in 1978 to continue the feasibility study.

Because of the time lapse since 1972 and new planning criteria for water resource studies, the Corps held a second public meeting in November 1979 and prepared a Reconnaissance Report. The document was released in January 1981 and reported on study findings and presented a strategy for further investigations. Subsequent study effort focused on developing and assessing alternative solutions to the flood problem. This report presents the findings of this effort.

## STUDY AUTHORITY

Following requests by State and local interests the Honorable James C. Cleveland and the Honorable Louis C. Wyman, New Hampshire Congressmen, jointly sponsored a resolution to study flooding and associated problems along the Winnepesaukee River and Lake Winnepesaukee. The following resolution was adopted on 14 July 1970 by the Committee on Public Works of the U.S. House of Representatives:

"Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Merrimack River, Massachusetts and New Hampshire, contained in House Document Number 689, 75th Congress, Third Session, and other pertinent reports, with specific reference to Winnepesaukee River, New Hampshire, with a view to determining the advisability of improvements in the interest of flood control and allied purposes."

Following severe flooding that occurred within the Winnepesaukee River Basin during June 1984, State and local officials stressed the need for immediate action. To best expedite implementation of the proposed project, the selected plan of flood loss reduction as described in this report was submitted for authorization under the special continuing authority contained in Section 205 of the 1948 Flood Control Act, as amended, which states:

"The Secretary of the Army is authorized to allot from any appropriations heretofore or hereafter made for flood control, not to exceed \$30,000,000 for any one fiscal year, for the construction of small projects of flood control and related purposes not specifically authorized by Congress, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable. The amount allotted for a project shall be sufficient to complete Federal participation in the project. Not more than \$4,000,000 shall be allotted under this section for a project at any single locality. The provisions of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, shall apply. The work shall be complete in itself and not commit the United States to any additional improvement to insure its successful operation, except as may result from the normal procedure applying to projects authorized after submissions of preliminary examination and survey reports."

## STUDY AREA

The Winnepesaukee River Basin lies entirely within the State of New Hampshire and covers a total area of about 488 square miles. The study area encompasses the entire Winnepesaukee River Basin, but particular attention has been directed toward those areas along the Winnepesaukee River and surrounding Lake Winnepesaukee which are susceptible to flood losses (see Plate 1).

## STUDY OBJECTIVES

The Corps of Engineers has prepared this report to document its findings in the Winnepesaukee River Basin Study. The report describes the study area, identifies water resource problems and opportunities, formulates potential measures to address these issues, evaluates measures, and recommends the most cost effective way to reduce the risk of future flood losses in the basin. This report has been prepared in accordance with existing administrative and legislative water resource policies, guidelines, and authorities pertinent to the Civil Works activities of the Corps of Engineers.

## PRIOR REPORTS

New Hampshire Public Water Resources Study, Groundwater Assessment - Anderson-Nichols, Inc. conducted this two-phase study. Phase one was completed in 1969 and phase two, a more detailed report utilizing data from phase one, was completed in 1972. Both phases entail an intensive look at New Hampshire water supply resources and systems. These reports identified the location, delineated the limits, and estimated the safe yield of aquifers throughout a 50-community study area in southeastern New Hampshire.

Lakes Region Water Quality Management Plan and Environmental Impact Statement - This draft report was prepared in January 1978 by the U.S. Environmental Protection Agency (EPA) and the Lakes Region Planning Commission. It discusses the technical and management alternatives that have been considered to deal with water quality problems of the Lakes Region and led to the conception of the Winnepesaukee River Basin Regional Sewage System, which is under construction. When this system is completed, it will collect raw sewage from eight communities in the basin and carry it to a regional treatment plant in Franklin.

Merrimack River Basin Overview - This report was published 30 June 1978 by the former New England River Basins Commission. It identifies gaps in the existing network of planning and water resource management programs and recommends measures to correct these deficiencies.

Southeastern New Hampshire Water Resources Study - This feasibility report was released in August 1982 by the Army Corps of Engineers. It presents the findings of an investigation of the entire water supply

situation in southeastern New Hampshire and recommends corrective measures based upon Corps model simulated demographic and economic projections for the study area. During this study, Lake Winnepesaukee was identified as a possible source of water for southeastern New Hampshire through a diversion at Alton Bay. However, this plan lacked public support due to its high cost and questionable need.

Hydropower Expansion Study for New England - This study by the former New England River Basins Commission and the Corps of Engineers includes an inventory and analysis of all existing and former dams in New England. This report was released in May 1979 and identified 11 operating hydropower plants and 150 former or existing dams in the Winnepesaukee River Basin. About 10 percent of these 150 sites are physically feasible to develop for hydropower based on a minimum 5-foot head and 50-kilowatt capacity.

Winnepesaukee River Basin Detailed Project Report - The flooding problem within the Winnepesaukee River Basin was identified during the Congressionally authorized study performed by the U.S. Army Corps of Engineers, New England Division. During feasibility studies, a variety of structural and nonstructural alternatives were developed to reduce the risk and severity of future flood losses within the basin. These studies determined that a comprehensive plan involving changes in the present regulation of Lake Winnepesaukee together with the construction of channel modifications and floodproofing measures along flood prone areas of the Winnepesaukee River was the most economical solution to the flood problem. Following the severe flooding that occurred during June 1984, State and local officials stressed the need for immediate action. To expedite implementation of proposed flood loss reduction measures, this Detailed Project Report was prepared and submitted to the Chief of Engineers in June 1985. The report recommends that the comprehensive plan of flood loss reduction be authorized for construction as a Federal project under Section 205 of the Continuing Authorities Program.

#### EXISTING PROJECTS

There are no Federally constructed flood control projects in the Winnepesaukee River Basin.

The Corps of Engineers maintains a navigation channel 3,000 feet long, 50 feet wide and not less than 5 feet in depth at lowest known stage of water from Meredith Bay to Paugus Bay. This project was completed in 1882.

## II. EXISTING CONDITIONS

### BASIN DESCRIPTION

The Winnepesaukee River Basin is located in central New Hampshire and is one of the most outstanding four-season recreational areas of New England. The watershed is part of the Merrimack River Basin and drains an area of 488 square miles. The most dominating feature of the watershed is Lake Winnepesaukee, which is one of the largest freshwater lakes in north-eastern United States. The lake has a surface area of 72 square miles and is a natural water body formed by glacial deposits which blocked former drainage paths. The upper 6 to 8 feet of the lake is regulated by the NHWRB through discharges from Lakeport Dam located at the outlet of Paugus Bay in Lakeport, New Hampshire.

The Winnepesaukee River originates at Lake Winnepesaukee and flows in a southwesterly direction approximately 23 miles to its confluence with the Pemigewasset River to form the Merrimack River. There are seven existing dams along the river and several more which have been breached. Extensive river navigation is precluded by river meanders, several bridge spans and the many dams. The NHWRB owns and operates three of these dams for the regulation of lake levels and river flows. The first of these, Lakeport Dam, controls the normal water surface elevation of Lake Winnepesaukee and Paugus Bay. The second, Avery Dam in Laconia, controls the water level of Opechee Bay and the third, Lochmere Dam, controls Winnisquam Lake. The river falls about 240 feet from Lake Winnepesaukee to the Pemigewasset River. About half of this drop in elevation is found in a 4-mile reach between Tilton and Franklin. In comparison, the upper reach of the river is comprised of a series of lakes controlled by the three dams mentioned above (see Figure 1).

### SOCIAL AND ECONOMIC CONDITIONS

Portions of 21 cities and towns in four counties lie within the Winnepesaukee River Basin, which has been defined as the study area for this report. Although many of these communities lie almost wholly within the basin there are some with only a small portion of their land area in the basin. However, all communities contribute to the character of the Lake Winnepesaukee area.

The U.S. Census provides 1980 population data for the area. The most populated community within the basin is Laconia, which borders Lake Winnepesaukee on the northwest, with a population of 15,575. Overall, population in the watershed communities increased 31.6 percent between 1970 and 1980. Table 1 displays the population and changes between 1970 and 1980 of the watershed communities. Growth in this region exceeded growth in the state, which was 24.8 percent during this period.

Significant seasonal population fluctuations occur in the region due to its appeal as a resort area. Although the area offers year-round

recreational opportunities, seasonal population increases are particularly apparent in the summer months, when the year-round population is estimated by area planners to double.

Table 1  
Population, 1970 & 1980  
Winnepesaukee River Watershed

<u>Communities</u>	<u>1970</u>	<u>1980</u>	<u>Percent Chg.</u> <u>1970-1980</u>
Belknap County			32.5
Alton	1,647	2,440	48.1
Belmont	2,493	4,026	61.5
Center Harbor	540	808	49.6
Gilford	3,219	4,841	50.4
Gilmanton	1,010	1,941	92.2
Laconia	14,888	15,575	4.6
Meredith	2,904	4,646	60.0
New Hampton	946	1,249	32.0
Sanbornton	1,022	1,679	64.3
Tilton	2,579	3,387	31.3
Carroll County			50.6
Brookfield	198	385	94.4
Moultonborough	1,310	2,206	68.4
Ossipee	1,647	2,465	49.7
Sandwich	666	905	35.9
Tamworth	1,054	1,672	58.6
Tuftonboro	910	1,500	64.8
Wolfeboro	3,036	3,968	30.7
Merrimack County			21.5
Franklin	7,292	7,901	8.4
Northfield	2,193	3,051	39.1
Strafford County			21.3
Middleton	430	734	70.7
New Durham	583	1,183	102.9
TOTALS	50,567	66,562	31.6

#### Economy

Economic data for the study area was available by county and labor market area. Therefore, data for Belknap and Carroll Counties were utilized as being representative of the Winnepesaukee area. These two

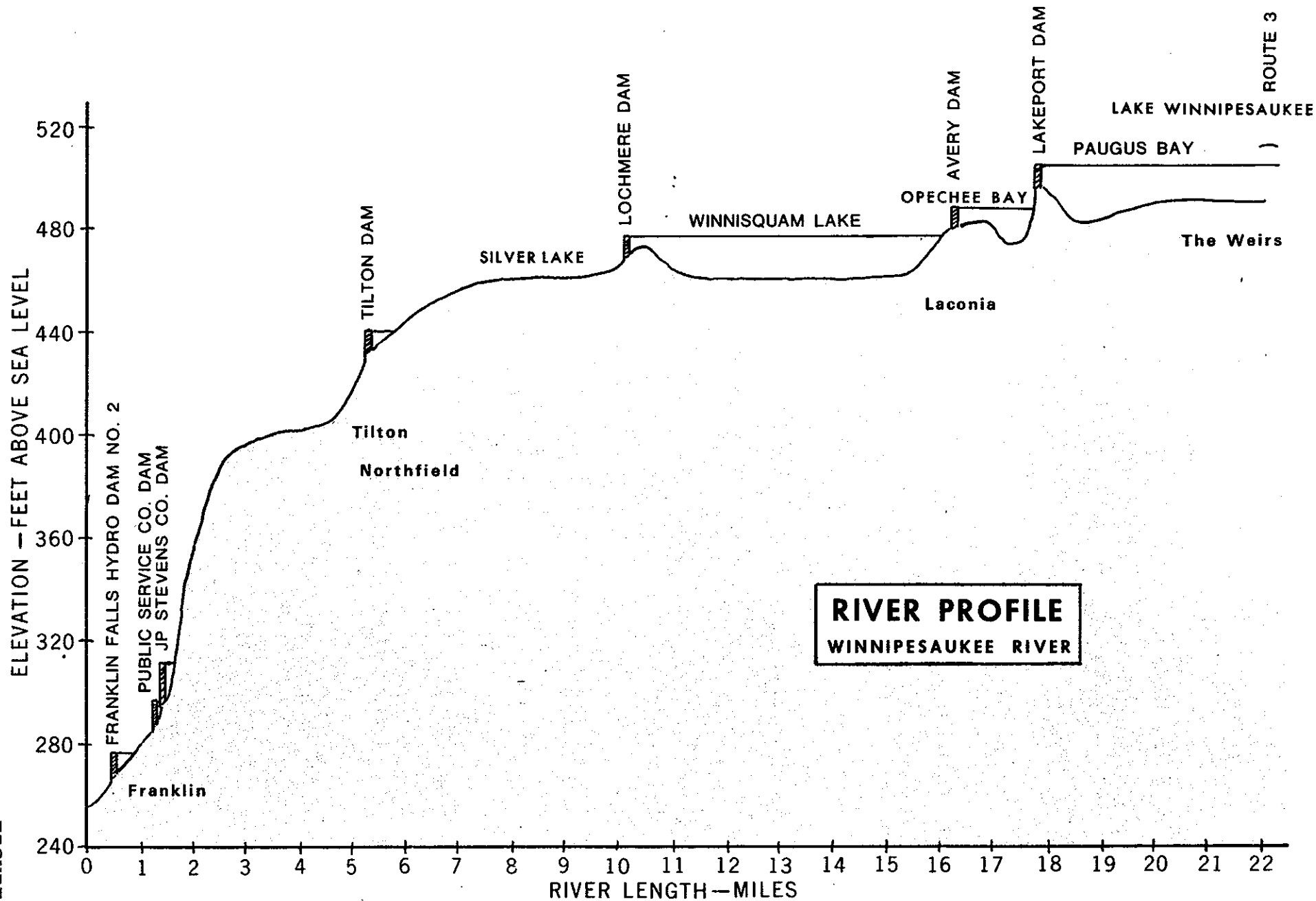


FIGURE 1



counties include 17 of the study area communities as well as an additional 13 communities. Some economic data for the Laconia Labor Market Area (LMA) has also been included. The LMA includes 36 communities in Belknap, Carroll, Grafton, and Merrimack Counties.

Manufacturing was dominant in Belknap County accounting for 30 percent of the employment. Over 75 percent of this employment is in durable goods principally electrical products and primary and fabricated metals. However, trade followed manufacturing closely with 28.5 percent employed in this sector. Services followed third. Employment statewide is similar with manufacturing, trade, and services occurring first, second, and third respectively. However, manufacturing still claims a larger proportion of statewide employment at 34.9 percent. Employment in Carroll County is highest in the trade sector, followed by services and then manufacturing. Data respective to these counties and the State is provided in Table 2.

Table 2  
Employment by Industry  
Average, 1981

<u>Industry</u>	<u>Belknap County</u>		<u>Carroll County</u>		<u>New Hampshire</u>	
	<u>Number</u>	<u>Percent of Total</u>	<u>Number</u>	<u>Percent of Total</u>	<u>Number</u>	<u>Percent of Total</u>
Manufacturing	4,243	30.0	1,613	18.4	116,493	34.9
Construction & Mining	1,302	9.2	537	6.1	20,759	6.2
Trans., Comm., & Util.	851	6.0	193	2.2	13,910	4.2
Trade	4,025	28.5	2,174	36.2	88,945	26.7
Fin., Ins., & Real Est.	663	4.7	475	5.4	20,111	6.0
Services	3,046	21.6	2,774	31.7	73,203	22.0
TOTAL	14,130	100.0	8,766	100.0	333,421	100.0

Source: NH Department of Employment Security

Manufacturing and nonmanufacturing in Belknap County had a 30-70 relationship in 1981, a sizeable shift from the 46-54 relationship existing in 1971. This shift to a nonmanufacturing service oriented economy is one prevalent throughout the State as well. Close to 90 percent annual growth in Carroll County occurred in trade and services, with more than two-thirds of the total employment in these two sectors.

Unemployment in December 1982 in New Hampshire was well under the unemployment rate experienced across the country. Carroll County fared even better than the State; whereas Belknap County's unemployment rate exceeded the States. The percent unemployed for December 1981 and 1982 is provided in Table 3 for Belknap and Carroll Counties, the Laconia LMA, the State and the nation.

Table 3  
Percent Unemployed  
December 1982

	<u>December 1982</u>	<u>December 1981</u>
Belknap County	7.7	7.6
Carroll County	6.8	4.9
Laconia LMA	7.6	7.1
New Hampshire	7.1	5.0
United States	10.5	8.3

Generally, median family incomes for study area communities fell below the State average of \$15,972 in 1979. Four communities; Gilford, Laconia, Brookfield and Tuftonboro had median incomes exceeding the State average.

#### Land Use

The region was first settled during the mid to late 1700's with agriculturally based villages. Non-farm development occurred during the early to mid 1800's as small factories and sawmills took advantage of the many available sources of water power. It is around the industrially based settlements that urban centers grew, including Laconia, Franklin, and Tilton.

Today, forest land is predominant in the Lakes Region taking up about 85 percent of the total land area. Trends in residential development closely reflect trends throughout the State. The shorelines of most water bodies are developed. Within the Lakes Region, the most intense residential development has occurred in the industrialized municipalities of Laconia, Tilton, Northfield and Franklin, and to a lesser degree in the resort centers of Meredith and Wolfeboro. As throughout the State, recent residential growth has taken the form of suburban sprawl with growth moving to the more rural communities, such as Belmont, Gilford, and Meredith, which are becoming bedroom communities for the city of Laconia. Considerable second-home development has occurred in the non-urban areas, due to the attraction of the lakes and mountains. Approximately one-third of the 39,190 housing units in the study area are seasonal units. Although communities in the region have a wide range of populations, each community has an identifiable center comprised of government offices, schools, libraries, function halls, and commercial buildings.

Recreation and open space uses make a major contribution to the land use patterns in the Lakes Region, including a number of municipal recreation areas, State Parks and Forests, and Federally owned lands.

The communities with the highest densities of population occur along major highways and where the highway system, rail system and river systems

come together. This density is the result of past industrial growth, where more recent growth is related to tourism and recreational development.

## ENVIRONMENTAL SETTING

### Geology and Topography

Located within the New England Upland Section of the New England Province, the basin consists of a maturely dissected region of relatively high relief. Mountains are found to the north and east, but the terrain is hilly for the majority of the study area. The valleys are pinched and filled with sandy deposits, ranging from 0 to 250 feet thick at the center of the valleys. Glacial till deposits generally cover the uplands in the study area. The valleys have been filled with fluvioglacial and recent stream deposits. The bedrock underlying the area is principally mica schist. Granites and syenites form the mountainous areas.

### Climate and Precipitation

The Winnepesaukee River Watershed experiences a climate of moderately warm summers and cold winters with heavy snowfall. Average annual precipitation is about 42 inches with an average annual snowfall of about 80 inches. The mean annual temperature is about 46° Fahrenheit, varying from summertime highs in the nineties to wintertime lows in the minus twenties.

### Fish and Wildlife Resources

The importance of the Winnepesaukee River and tributary lakes to fish and wildlife resources is significant. The river has a viable aquatic community and the lakes support fishery and wildlife resources which are important to the economy of central New Hampshire.

The study area contains both cold and warm-water fisheries. Lake Winnepesaukee and the smaller lakes are well known for their populations of landlocked salmon and lake trout. The lakes also support populations of smallmouth bass, whitefish, pickerel and several panfish species. The fishing pressure is heavy especially in the spring and summer, and considerable ice fishing pressure has also developed, making the area a "four-season" fishery.

The Winnepesaukee River is annually stocked with rainbow trout in the reach from Silver Lake, immediately downstream of Lochmere Dam, to the town of Tilton. The stocking program also includes brook trout and brown trout in various reaches of the river. Salmon are taken frequently at Silver Lake and upstream to Laconia. An excellent fishery for smallmouth bass exists in the slow-flowing reaches of the river, particularly in the Tilton and Silver Lake areas. While American shad once used the river for spawning runs, dams and other obstructions along the Winnepesaukee River have eliminated its annual migrations. However, restoration efforts by State and Federal agencies has resulted in increasing spawning runs of

Atlantic salmon, American shad, alewives and blueback herring along the mainstem of the Merrimack River.

Whitetail deer is the primary game mammal found in the watershed, with gray squirrel and snowshoe hare also providing hunting opportunities. The numerous wetlands, slow channel reaches and backwater areas of the river provide nesting, resting and feeding sites for many waterfowl species. These areas also supply habitat for muskrat, mink, beaver and otter. American woodcock and many species of songbirds are also present. These and numerous other non-game wildlife species provide opportunities for nature study, photography and bird watching.

#### Endangered and Threatened Species

Except for occasional transient individuals, such as the bald eagle, no Federally listed or proposed species under the jurisdiction of the U.S. Department of the Interior are known to exist in the project impact areas.

The bald eagle is listed as endangered under the State of New Hampshire Endangered Species Conservation Act. Presently, most eagle activity is in the winter months along Opechee Bay in open waters. According to the New Hampshire Natural Heritage Program and the New Hampshire Audubon Society, Lake Winnepesaukee is an historical nesting area for the bald eagle and may have potential for reoccupation by this species.

The common loon and osprey are listed as threatened under the State of New Hampshire Endangered Species Conservation Act. Discussion of the common loon is provided in Section VI of the Environmental Assessment. Ospreys have often been sighted in the lakes region. Purple martins and bluebirds are also on the State threatened list.

The New Hampshire Natural Heritage Inventory maintains a list of rare plants. This list is based on work performed by Stocks and Crow in 1978, and has been updated to reflect subsequent field investigations.

#### Vegetation

The Winnepesaukee area is basically a rough wooded plateau with farmlands concentrated in valleys or on smooth ridges. First and second growth timber of mixed coniferous-northern hardwoods covers the hills and much of the valley area. Forest zones in this area are classified as Transition Hardwood and contains white pine and hemlock, red and white oak, red maple and large tooth aspen. These species occur in varying mixtures depending upon the area and are usually found growing at elevations above 1000 feet on moderately well drained soils. The Northern Hardwoods-Hemlock zone is also found in the lakes region, and may contain sugar maple, hemlock, white or yellow birch, white pine, American beech and/or red oak. This forest type usually grows at elevations from 500 to 2500 feet above sea level on moderately well drained to somewhat poorly drained soils.

## Water Quality

The waters of the Winnepesaukee River Basin have been designated as a Class B/cold water fishery according to the New Hampshire Water Supply and Pollution Control Commission (NHWSPPC). Class B waters have high aesthetic value and are acceptable for swimming and other recreation, fish habitat, and use as water supplies after adequate treatment.

The region is so dependent upon water related activities that local officials and citizens have taken action to improve and protect the water quality of the lakes and streams within the basin. As part of a three-year, areawide waste treatment management process, which was funded by the EPA under Section 208 of the 1972 Federal Water Quality Act Amendments, a draft Water Quality Management Plan and Environmental Impact Statement was prepared in 1978. This report discusses the technical and management alternatives that have been considered to deal with water quality problems of the Lakes Region. It was observed that discharges from municipal wastewater treatment facilities have resulted in low dissolved oxygen levels, aquatic nuisances, and algae blooms in Winnisquam Lake and certain bays of Lake Winnepesaukee. The policy of New Hampshire is not to allow any new points of discharge into lakes and contributing streams, and to treat existing discharges to a technically feasible extent. The continuing development along Winnisquam Lake and the western shoreline of Lake Winnepesaukee led to conception of the Winnepesaukee River Basin Regional Sewer System. The main trunk line of this system, which was completed in 1980, collects raw sewage from eight communities (Franklin, Tilton, Northfield, Belmont, Sanbornton, Laconia, Gilford, and Meredith) and carries it to Franklin where it undergoes secondary treatment. Lateral expansion within these eight communities is about 90 percent complete. The remaining work is scheduled to be completed over the next few years. Construction of the regional sewerage system will have a substantial effect on improving and protecting the water quality of the lakes and streams within the region.

Another factor affecting water quality in the Winnepesaukee River Basin is stormwater runoff, which has the potential of picking up and carrying high levels of pollutants to lakes and streams. While the Winnepesaukee River can hardly be classified as an urban area, the region does experience heavy year-round usage. Concurrent with the population increase, urban runoff from sources such as highways, parking lots, and roofs will increase, and particulate fallout from automobiles and increasing industrialization will occur. Predictably, stormwater runoff will become more highly polluted in developed areas. Land use controls offer the most cost effective means of safeguarding against pollution from stormwater runoff.

## Historic and Archaeological Resources

Prehistoric occupation of the study area extends to at least as far back as 7000 B.C. and appears to have been fairly intensive throughout the

period. Sites adjacent to the river are generally fairly large, and in many cases appear to reflect several successive periods of occupation. Though these sites appear to reflect a wide variety of subsistence and production activities, the location of many of them adjacent to rapids and narrows in the river indicates that taking of anadromous fish was a major activity through much of the prehistoric period.

Although the region was settled in the 18th century, most settlement near the river occurred during the 19th century in association with construction of mills at the major falls. The mill complexes at Laconia, Tilton, and Franklin developed during this period as did the smaller settlements of Lakeport and Lochmere. Dams built during this period frequently adjoin prehistoric fishing station sites, as both tended to locate at falls. Further commercial and residential development throughout the region relates to tourism, and spans the period from the late 19th century to the present.

#### STREAMFLOW

Flows along the Winnepesaukee River are recorded by the U.S. Geological Survey (USGS) at the outlet of Paugus Bay in Lakeport and just downstream of Tilton Island in Tilton. The gage in Lakeport has been in continuous operation since June 1933 and the one in Tilton since January 1937. The average flow at Lakeport is 534 cfs, which is equivalent to 19.9 inches of runoff from the 364 square mile watershed or about 48 percent of average annual precipitation. At the Tilton gage the average flow is 702 cfs, which is equivalent to 20.4 inches of runoff from its 473 square mile watershed or 49 percent of average annual precipitation over the total watershed.

#### FLOOD HISTORY

History has shown that the Winnepesaukee River Basin is most vulnerable to flooding during the spring when a combination of rainfall and snowmelt can produce a large volume of runoff and cause severe flooding. Table 4 shows that of the six greatest known floods on the Winnepesaukee River, four have occurred during the spring. Many of the past floods (March 1936, May 1954, and July 1979) were the result of two rainfall events which occurred a few days apart. This demonstrates the fact that the Winnepesaukee River does not have sufficient capacity to handle releases from Lakeport Dam necessary to draw down the lake quickly and prepare for anticipated rainfall. After a storm, Lake Winnepesaukee may remain at or above full level for weeks. If a second storm should occur while the lake is above full pool with no available flood storage, damages on the lake will result.

Flooding on Lake Winnepesaukee and along the Winnepesaukee River are interrelated. Damages have occurred when the combination of available storage in Lake Winnepesaukee and carrying capacity of the Winnepesaukee River have not been able to handle the total volume of runoff during an event. When excess runoff is stored in the lake, water levels rise and

shorefront property is damaged. The extent of the lake flooding is a function of the volume of runoff and antecedent lake level. If excess runoff is discharged through Lakeport Dam, the channel capacity of the Winnepesaukee River is exceeded and riverfront property is damaged. Flooding along the Winnepesaukee River can also be caused by runoff from the intervening drainage area below Lakeport Dam

Table 4  
HISTORIC FLOODS, WINNIPESAUKEE RIVER BASIN

<u>Date</u>	<u>Lake Winnepesaukee</u>					<u>Winnepesaukee River</u>
	<u>Rainfall</u>	<u>Status</u>	<u>Rise</u>	<u>Crest</u>	<u>Lakeport Dam</u>	<u>Recorded</u>
	<u>inches</u>	<u>Prior to</u>	<u>(ft)</u>	<u>(NGVD)</u>	<u>Outflow</u>	<u>at Tilton Gage</u>
		<u>Storm</u>			<u>(cfs)</u>	<u>(cfs)</u>
March 1936	7.7	Down	4.5	505.7(Est)	2,890	6,000 (Est)
September 1938	6.6	Down	0.6	503.75	500	3,810
April 1953	3	Up	1.3	505.8	2,500	3,700
May 1954	4.2	Up	1.1	505.86	2,500	3,700
July 1973	2.7	Up	0.8	505.33	2,430	2,870
June 1984	8	Up	1.4	505.89	3,000	4,600

The majority of past flood losses have occurred to shorefront property surrounding Lake Winnepesaukee and Paugus Bay. These areas are in critical need of additional flood protection. Flooding has also occurred in areas along the Winnepesaukee River, but not nearly to the extent experienced on Lake Winnepesaukee. The NHWRB has been fairly successful in preventing flood losses along the Winnepesaukee River by limiting discharges from Lakeport Dam to 2,600 cfs. The Winnepesaukee River can pass this flow without major flood damages. This discharge has only been exceeded once since the flood of 1936. During the June 1984 flood, discharges from Lakeport Dam equalled approximately 3,000 cfs.

#### REGULATION OF LAKE WINNIPESAUKEE

The New Hampshire Water Resources Board (NHWRB) regulates riverflows and lake levels within the Winnepesaukee River Basin through the operation of Lakeport Dam, which controls outflows from Lake Winnepesaukee, and other dams located along the Winnepesaukee River. Under the current regulation criteria, the target level for Lake Winnepesaukee at the start of the recreation season (June 1) is elevation 504.3 feet above NGVD<sup>1</sup>. This elevation is defined as normal full lake and recreation interests have generally accepted this elevation and have adjusted to it. Throughout the summer and fall the level of Lake Winnepesaukee usually drops slowly as discharges, evaporation and other losses normally exceed inflows. During this period, Lakeport Dam is operated to ensure a minimum

<sup>1</sup>NGVD (National Geodetic Vertical Datum) is defined as the mean sea level of 1929.

downstream flow of at least 250 cubic feet per second (cfs). These regulated releases provide flows for hydropower generation and industrial uses on the Winnepesaukee and Merrimack Rivers. About December 15 the NHWRB gradually lowers the lake, approximately two feet below normal full lake, to accommodate runoff from spring rains and snowmelt. This annual drafting of the lake has historically provided considerable flood control storage as well as low flow augmentation. The spring runoff is then used to refill Lake Winnepesaukee to 504.3 feet NGVD for the start of another recreation season.

Under average conditions the operating schedule provides for an effective balance of water levels in Lake Winnepesaukee and flows along the Winnepesaukee River. However, extreme or above normal runoff events in the spring, such as the May 1954 and June 1984 floods, cannot be accommodated without flood problems. During the summer months, with the lake at elevation 504.3 NGVD, only a 7 inch rise in stage (equivalent to 1.4 inches of runoff over the drainage area) is available before initial flood damage stage is reached. Major storms occurring after the 1 June target date, such as occurred in July 1973, have the potential to cause extensive damages. If water is stored on the lake, shorefront properties will be damaged. If high discharges are released from Lakeport Dam, damages will be sustained by properties along the river and downstream lakes including Opechee Bay, Winnisquam Lake and Silver Lake.

#### HYDROPOWER

Historically, the major source of power in the basin has been water, especially along the Winnepesaukee River where dams and mills sprung up to take advantage of the river. As late as the 1950's the river had seven hydroelectric plants operating along its course. As energy from oil became more readily available and less costly, hydropower plants were phased out and up until recently only one plant was operating along the Winnepesaukee River.

Recent legislation by the State of New Hampshire provides an economic incentive by guaranteeing an attractive selling price for any electricity developed at small hydropower sites. Private developers have recently completed construction of hydropower facilities at Lakeport and Lochmere Dams, the removal of Tilton Dam and construction of a new dam about 800 feet downstream, and the addition of a new penstock at J.P. Stevens Dam. Several other sites, including Avery Dam, are being investigated for possible development.

#### WATER SUPPLY

There appears to be no immediate or short-range water supply needs for communities within the study area. The major issue concerning water supply relates to the growing needs outside the basin in southeastern New Hampshire. Previous studies identified Lake Winnepesaukee as a potential source of water through a diversion at Alton Bay. However, this plan lacked public support due to its high cost and questionable need.



## RECREATION

Recreation in the Winnepesaukee River Basin accounts for a large portion of the area's economic base. According to the New Hampshire Fish and Game Department, hunting and fishing within the Winnepesaukee River Basin generates 180 million dollars annually. Its series of lakes and connecting waterways has attracted increasing numbers of people for recreational purposes with continued growth anticipated. The shoreline of the lakes and bays are built up with cottages, motels, condominiums, and retail stores which cater to the recreational visitor. The basin is a major resource for year-round water oriented recreation in New England. The communities of Laconia, Lakeport, and Franklin have developed town parks and open spaces along the river and have incorporated recreational development into their master plans.

Lake Winnepesaukee supports intensive boating, fishing, water skiing and swimming. In the winter the lakes are a major center for ice fishing in New Hampshire. The wetlands area of Silver Lake provides an excellent area for passive recreation and nature study. Wilderness oriented recreation is an important resource in the upper reaches of the basin area. Some canoeing and hiking activities are also found along the lower reaches of the Winnepesaukee River below Lochmere Dam.

In 1979 the New Hampshire State Commission of Outdoor Recreation Planning (SCORP) identified the outdoor recreational facilities in the Lakes Region. Recreational facilities located along the Winnepesaukee River from Lake Winnepesaukee to its confluence with the Pemigewasset River are shown on Figure 2. Boating areas, campgrounds, canoe waterways, and beach areas are found much more commonly than in the remainder of the State. The general condition of these facilities is considered between adequate and good.

The Lakes Region has 120 campgrounds both public and private, 53 natural areas, and 158 water sport areas. Natural areas are facilities which are primarily used or noted for their inherent natural features, such as State forests, freshwater marsh areas, and local conservation commission or preservation lands. Water sport areas are facilities which have land access to water which is primarily used for water contact recreation or boating, including swimming and beach areas.

The recreation based economy of the region is very dependent upon the water quality of the lakes and streams. The invasion of water milfoil (Myriophyllum heterophyllum) into Lake Winnepesaukee has hampered recreational activities in the area. This aquatic plant has taken over large areas along the shores of Lake Winnepesaukee and Winnisquam Lake making it difficult to swim, boat, and fish. As reported by the New Hampshire Times, the milfoil invasion "...has frustrated and angered legions of cottage owners, camp operators, marina owners, and ordinary folks trying to have a good time."

### III. PROBLEM IDENTIFICATION

This section describes the most probable future conditions and related water resource problems for the study area assuming no new Federal water resources project is constructed. Alternatives presented later in this report are assessed and evaluated by comparing them to the "without project" condition.

#### WITHOUT PROJECT CONDITIONS

##### Future Population

Population projections provided by the New Hampshire Office of State Planning indicate a 65.9 percent increase for the study area between 1980 and 2030. Those communities shown as having the highest rate of growth include: Moultonborough, Ossipee, Tamworth, Tuftonboro, Northfield, Middleton, and New Durham whose populations are expected to more than double. Showing the smallest change in population is the community of Belmont, growing only 2.3 percent. No communities in the study area are expected to have population losses. Population projections are shown in Table 5.

##### Future Economy

No definitive employment projections were available for the Lakes Region. It can only be anticipated that recent trends will continue, and employment will grow with population.

The manufacturing sector will maintain its dominance as the largest employer. There will be shifts within the manufacturing industries, with continued growth in the durable goods sector. The fabricated metals industry and the electrical products industry have shown the largest employment gains over the twenty years between 1960 and 1980. The textile industry, once a major employer, will continue to lose its proportion of employment.

TABLE 5  
POPULATION PROJECTIONS

	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2020</u>	<u>2030</u>	<u>Percent Changes</u> <u>1980-2030</u>
<u>Belknap County</u>						
Alton	3,045	3,362	3,597	3,848	4,119	68.8
Belmont	5,056	5,582	5,972	6,390	8,836	2.3
Center Harbor	1,014	1,120	1,199	1,283	1,379	70.7
Gilford	5,760	6,113	6,365	6,628	6,901	42.6
Gilmanton	2,421	2,673	2,860	3,060	3,274	68.7
Laconia	16,819	17,343	17,737	18,143	18,787	20.6

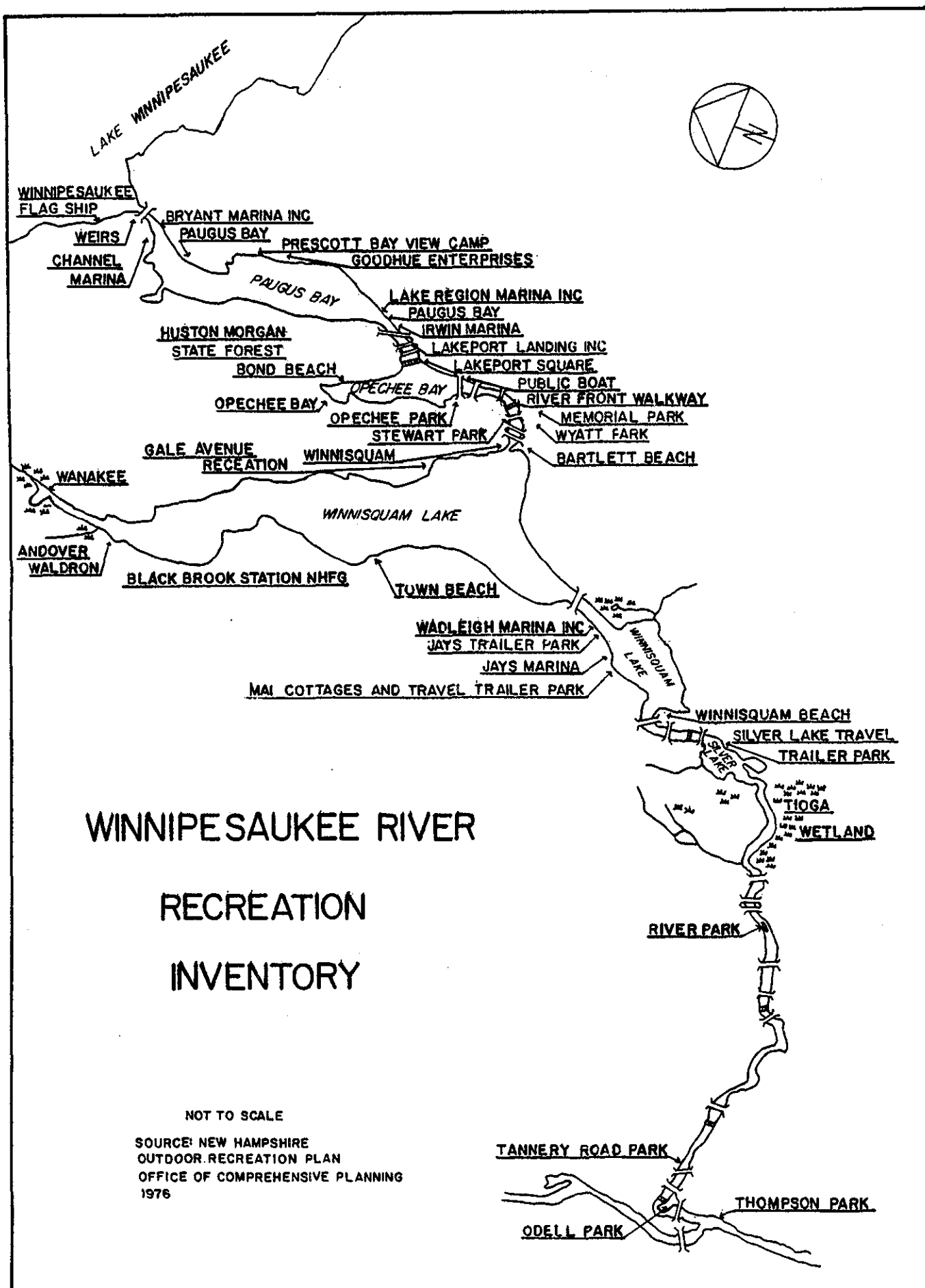


FIGURE 2

Meredith	5,804	6,409	6,858	7,338	7,859	69.2
New Hampton	1,515	1,647	1,744	1,846	1,962	57.1
Sanbornton	2,095	2,313	2,475	2,648	2,833	68.7
Tilton	4,125	4,468	4,720	4,985	5,277	55.8

Carroll County

Brookfield	499	599	694	804	932	142.1
Moultonborough	2,804	3,367	3,901	4,520	5,239	137.5
Ossipee	3,236	3,898	4,516	5,248	6,183	150.8
Sandwich	1,041	1,140	1,227	1,320	1,421	57.0
Tamworth	2,158	2,594	3,006	3,486	4,054	142.5
Tuftsboro	1,960	2,369	2,750	3,204	3,795	153.0
Wolfeboro	4,964	5,683	6,335	7,063	7,880	98.6

Merrimack County

Franklin	8,941	9,495	9,865	10,244	10,653	34.8
Northfield	3,916	4,685	5,251	5,882	6,595	116.2

Strafford County

Middleton	962	1,233	1,375	1,534	1,711	133.1
New Durham	1,550	1,985	2,215	2,468	2,753	132.7
TOTAL	79,685	88,078	94,662	101,942	110,443	65.9

Source: NH Office of State Planning, April, 1981.

Employment gains in nonmanufacturing industries have been strongest in the services and trade sectors, a trend likely to continue.

Recent gains in these sectors exceeded statewide trends. Fluctuations in seasonal employment will continue to be controlled by the recreation/tourist industry. These seasonal fluctuations are most pronounced in smaller lake front communities with a small manufacturing base.

Future Land Use

The overall goal that resulted from the regional planning efforts of the late 1970's was "to accommodate both economic development and environmental protection to the future growth of the region. Maintenance and improvement of water quality and air quality are of prime importance."\*

\* Regional Land Use Plan for the Lakes Region, Lakes Region Planning Commission, 1978, p. 38.

Future land use patterns which eliminate sprawl would be encouraged. This would permit the retention of significant areas of open space and minimize the need for additional public facilities and services. Growth would thereby be more desirable in or near existing town centers rather than in outlying areas.

The objective of future economic development would be to develop a balanced regional economy that wisely uses the region's natural, man-made, and human resources. Policies to accomplish this are to diversify the economic base of the region and encourage new non-polluting industry in areas provided with public facilities.

The region has also set forth many environment and energy related goals pertaining to protection of ground and surface water quality and the use of renewable energy resources.

These goals and objectives along with others that are provided in more detail in the regional policy are to guide planners and local officials who are responsible for specific policies at the municipal level.

#### Future Flooding

The NHWRB will continue to operate its dams to maintain a balance of lake levels and downstream flows. Flood damages will continue as they have in the past. Eventually some future flood will again cause major flood damages to shoreline properties on the lakes and along the Winnepesaukee River. This could occur during an unusually high spring runoff or as an aftermath of a major summer or fall storm that occurs when the lake is full. As some bridges and dams become obsolete and are replaced or destroyed, new structures would be designed to handle greater flows. This is a long-term proposition which may or may not occur.

The flood insurance program will continue to offer local businesses and residents subsidized insurance to reimburse flood losses. Future flood plain development should be guided by land use regulation set forth as part of the flood insurance program and the increase in flood damage potential should be slowed. At present, all but four communities in the basin (Centre Harbor, Middleton, Moultonboro, and Gilmanton) are enrolled in the insurance program. Seven of the communities (Sanbornton, Tilton, Franklin, Laconia, Brookfield, Holderness, and Northfield) have completed detailed studies and are in the regular program.

#### Future Hydropower

With rising energy costs and concern over resource use, redevelopment of once productive hydropower sites is likely to continue through a series of independent efforts. Applications for the reconstruction or retrofitting of existing dams for the use of hydropower are reviewed by the NHWRB to ensure that these proposals will not restrict flows

or worsen existing flood conditions. As these sites are redeveloped, flooding conditions should be reduced as existing dams are renovated to allow greater discharge capacity and channel restrictions near proposed hydropower sites, such as breached dams, are removed. The hydraulic and hydrologic studies performed during this study will provide helpful guidance on the effects of hydropower development along the Winnepesaukee River.

#### Future Recreation

Recreation in the area will continue to increase in response to increased demand and improved water quality. Additional development will take place and the population of the region will increase. This additional development could produce the potential for more serious flooding unless appropriate land use planning is implemented.

#### Future Water Quality

The water quality of the Winnepesaukee River Basin should improve as communities are connected into the Regional Sewer System. Collection and treatment of wastewater discharges within the basin should reduce phosphorus levels below that needed to encourage and maintain algae blooms.

### PROBLEMS AND OPPORTUNITIES

#### Flood Problem

Lakes in the Winnepesaukee basin are highly effective in controlling the flood runoff from their respective watersheds. Lake Winnepesaukee controls the runoff from 351 square miles which is 72 percent of the total Winnepesaukee watershed. Runoff is stored in the lake causing lake levels to rise with some periodic peripheral flooding. The extent of lake flooding is more a function of volume of runoff, than rate of runoff, and antecedent lake level.

Flooding along the downstream Winnepesaukee River is caused by high discharges, produced either by runoff rates from the intervening drainage area or by releases from lake storages. High flows can also result from a combination of lake releases and intervening runoff; however, the occurrence of peak storm runoff, coincident with peak lake outflow is extremely unlikely. Nondamaging channel capacity from Lake Winnepesaukee through Laconia is presently about 2600 cfs, whereas channel capacity in Tilton is approximately 3500 cfs. These are low channel capacities for a drainage area of 488 square miles, greatly restricting lake regulation in the basin, as well as creating a flood potential from intervening watershed runoff. Two of the largest historic floods on the Winnepesaukee River occurred in March 1936 and most recently in June 1984; and three of the highest historic levels on Lake Winnepesaukee occurred in April 1953, May 1954, and June 1984.

## PROBLEM AND OPPORTUNITY STATEMENTS

The following problem and opportunity statements evolved during study activities based on concerns and comments expressed by the NHWRB and local interests. These statements provide guidance in the formulation of a complete water resources project, as well as a standard for comparison in the evaluation of each proposal's achievements. The problem and opportunity statements for the 50-year period of analysis, beginning in 1985 are:

- a. Develop a flood damage reduction plan that reduces the \$5 million in average annual damages and the financial hardships that result from flooding within the Winnepesaukee River Basin.
- b. Develop a flood damage reduction plan which is compatible with or enhances the environmental, recreational, and cultural values of the Winnepesaukee River Basin.
- c. Develop a flood damage reduction plan which is compatible with or contributes to the redevelopment and operation of hydropower sites along the Winnepesaukee River.

#### IV. PLAN FORMULATION

This section describes the range of alternative plans considered to reduce flood damages in the Winnepesaukee River Basin. Alternatives were investigated in sufficient detail to determine their economic and engineering feasibility, the impacts of their implementation and public acceptance. Those alternatives that warranted further study are presented at the end of this section.

##### PLANS OF OTHERS

Plans that address or affect the problems and opportunities of the study area that have been or are proposed to be implemented by Federal or non-Federal agencies are described in the following paragraph.

There are seven existing dams along the Winnepesaukee River and several more which have been breached. Many of these sites have been redeveloped for hydropower and others are being examined.

##### MANAGEMENT MEASURES

##### Flood Protection

Flood protection measures fall into two basic categories: structural and nonstructural. Structural measures are those which reduce damages by restricting flood waters to the river, while nonstructural measures allow overbank flooding but reduce or mitigate damages by individually protecting or relocating flood prone structures. The two general categories of flood protection measures are shown in Table 6.

TABLE 6  
ALTERNATIVE FLOOD PROTECTION MEASURES

- I. Structural
  - A. Reduce Flooding Prior to Reaching Critical Damage Area
    - 1. Reservoirs
    - 2. Bypasses
    - 3. Land Treatment
  - B. Reduce Flooding at Critical Damage Area
    - 1. Levees and Floodwalls
    - 2. Channel Modification
- II. Nonstructural
  - A. Reduce Actual Damages
    - 1. Floodproofing
    - 2. Relocation
    - 3. Land Use Regulations and Zoning
    - 4. Flood Warning and Emergency Evacuation
  - B. Mitigate Damages
    - 1. Flood Insurance



## PLAN FORMULATION RATIONALE

The plan formulation process involves the development and evaluation of the management measures contained in Table 6. Each measure was assessed in terms of social, environmental, and economic impacts and public acceptance. The subsequent sections provide information on plan description, evaluation and comparison which lead to the selection of the most feasible plan.

Reservoirs - Lake Winnepesaukee is operated by the NHWRB as a multi-purpose reservoir. Releases are made during the summer, fall, and winter months to augment downstream low flows in the interest of power generation. This usually causes a gradual lowering of the lake. During the spring snowmelt period, the lake is refilled for the start of the recreation season (1 June - 15 October). Annual drafting of the lake has provided considerable flood control storage as well as low flow augmentation. However, with increased recreation in the basin, there has been greater emphasis on maintaining the lake at or near full pool during the entire recreation season. Such regulation not only limits available low flow for hydropower generation, but with the lake near full pool for most of the recreation season it enhances the potential for damaging flood levels at the lake and/or along the downstream river. During this study, four alternatives to reduce flood damages in the basin were considered involving modification of the present operation of Lake Winnepesaukee.

(1) Lower Normal Lake Level - Normal full pool for Lake Winnepesaukee is defined as elevation 504.3 feet NGVD. Recreation and hydropower interests have generally accepted this elevation and have adjusted to it. Under present conditions, flood damages on the lake begin at approximately elevation 504.9 feet NGVD or about 7 inches above normal full pool. Because of the close proximity of development to the shoreline, any increase in lake levels usually causes problems. If the lake could be maintained at a lower level, it would provide added flood storage throughout the year. The danger associated with lowering the normal full pool elevation of Lake Winnepesaukee by any amount is that if controls on development are not implemented recreation interests would again gravitate toward the water and shoreline, duplicating the present flood damage potential at a lower lake level.

At the request of the Lake Winnepesaukee Association, the NHWRB held a Lake Level Hearing on 12 October 1984. The purpose of the meeting was to discuss the present management of Lake Winnepesaukee. Among the topics discussed was the possibility of lowering the normal full pool elevation of Lake Winnepesaukee. During the meeting, recreation and hydropower interests in the basin voiced strong opposition to any decrease in the normal full pool of Lake Winnepesaukee (see letter from Delbert F. Downing, Chairman of the NHWRB, dated 13 November 1984 contained in Appendix A). Hydropower interests fear that a decrease in lake levels would limit the amount of water available for hydropower generation during the summer, fall, and winter months. If the lake was lowered, marinas

that have the minimum amount of clearance for navigation would require deepening and thousands of docks and piers would have to be lowered. Decreases in lake levels could also impact on fish spawning and waterfowl nesting areas.

(2) Modify the Spring Fill-up Schedule - During the fall and winter months Lake Winnepesaukee is drawn down to accommodate spring runoff. One of the primary goals of the NHWRB is to assure a full lake (elevation 504.3 feet NGVD) by June 1 for the start of the recreation season. Usually they begin filling the lake on or about the first of March. The decisions affecting the timing of this procedure are complicated by variables such as snow pack, temperature and rainfall. In recent years, recreational interests have stressed the importance of a full pool at the start of the recreation season. In attempting to meet the June 1 goal, lake levels have been raised early during the spring fill-up period sacrificing valuable flood storage. This study has concentrated on technical analyses and hydrologic modeling of the basin. From this analysis a set of guide curves (see Figure 3) has been developed to assist the NHWRB during the spring fill-up period that will help reduce the risk of premature filling of the lake without increasing the risk of not obtaining a full pool. The guide curves, when tempered by the NHWRB's years of experience, can be used to obtain a gradual filling of the lake assuring both a full pool by June 1 and a significant amount of storage for flood waters during the spring fill-up period.

During the study it was suggested that the spring fill-up period be extended through 15 June. This would provide even greater storage for flood waters on the lake during the fill-up period. However, this would increase the risk of not obtaining a full pool for the recreation season.

During the 60-day public review period, Mr. Jeff Fair, Director of the Loon Preservation Committee, indicated that the proposed spring fill-up schedule may be detrimental to nesting loons (see Mr. Fair's letter dated February 13, 1985 contained in Appendix A). The common loon (Gavia immer) is on the State of New Hampshire's list of endangered species. Loons normally nest during May. Rises in Lake levels of six inches or more during this time are detrimental to their successful nesting. Using the proposed guide curves the average rise in lake levels during May would be about six to seven inches. This rise is greater than the current average, which was about four inches over the 10-year period between 1973-1982.

To address Mr. Fair's concerns, the guide curves were refined to reflect the differences in average monthly inflow during March, April, and May. The modified guide curves are shown in Figure 4. This refinement would reduce the proposed rise in lake levels during May to between three and four inches as shown on Figure 5, while still reaching the target full pool level by June 1.

Close coordination between the Loon Preservation Committee and the NHWRB on use of the guide curves and proper lake level regulation during the critical May timeframe would help to further reduce any effects of lake level rises on nesting loons.

This alternative could be implemented at no cost and would reduce the risk of flood damages during the spring fill-up period (1 March - 1 June). Annual benefits attributed to adoption of the guide curves total \$2,692,700. It should be noted that this alternative would only provide added flood protection during the spring fill-up period.

(3) Modify the Fall Draw-down Schedule - During the period June 1 through December 15 the New Hampshire Water Resources Board releases a minimum discharge of 250 cfs from Lakeport Dam to provide flows for hydropower generation and maintain the level of Lake Winnepesaukee for recreational use. This release usually causes a gradual lowering of the lake as discharges, evaporation and other losses normally exceed inflows. After December 15 the NHWRB begins their annual draw-down. Under this regulation procedure the lake remains dangerously close to full pool for most of the summer and fall seasons.

Through discussion with the NHWRB, a modified fall draw-down schedule was developed to provide added flood protection. Under this alternative, regulation of the lake would remain the same from June 1 through September 1. The NHWRB would maintain minimum discharges of 250 cfs. If by September 1 the lake has dropped more than 1 foot below normal full pool, the NHWRB would maintain minimum discharges through October 15 then begin their annual draw-down. If by September 1 the lake is less than 1 foot below normal full pool, the NHWRB would begin a gradual lowering of the lake. This will provide added flood storage in the lake for a portion of the hurricane season which lasts from June through November. This plan allows time in the late fall for lakefront property owners to make repairs to their walls and beaches and provides more gradual releases in the fall and winter months to augment low flows for hydropower generation.

Until recently, the NHWRB allowed the level of Lake Winnepesaukee to gradually drop during the summer and fall months, similar to the modified fall draw-down schedule. However, over the last few years the NHWRB has allowed the lake to remain slightly higher during the fall months to accommodate the increased recreational demand. Such regulation enhances the potential for flood losses. Adoption of the modified fall draw-down schedule would return lake regulation procedures to past conditions. For this reason, no benefits were taken for this alternative.

(4) Increase Discharges from Lakeport Dam - The NHWRB has been responsive to flood damage concerns in the basin by trying to maintain an acceptable balance between lake levels and river flows. As such, the lakes are operated as efficiently as possible and discharges from Lakeport Dam have not exceeded 2,600 cfs (except during the 1936 and 1984 floods). Generally, the Winnepesaukee River can pass this flow through damage areas

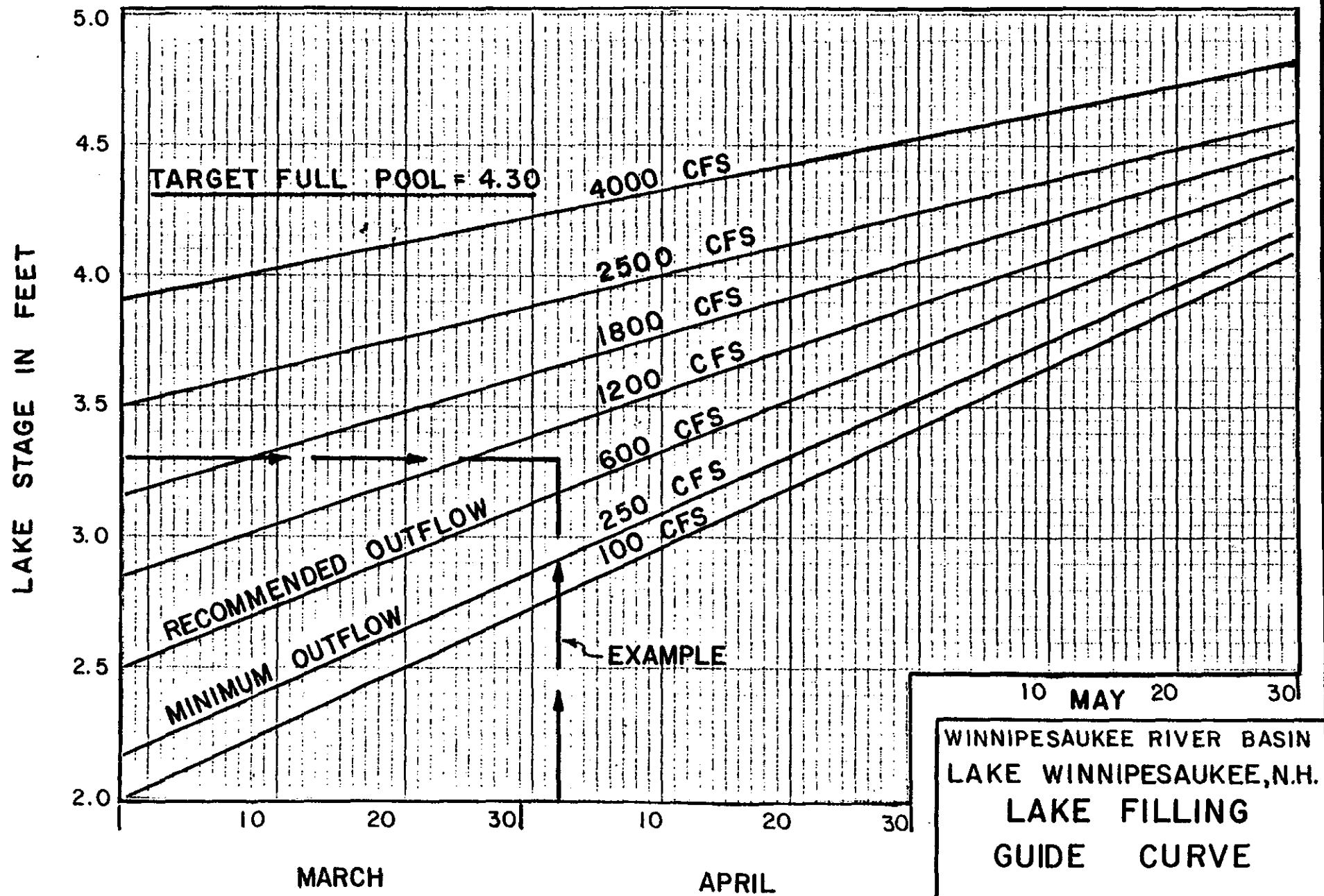


FIGURE 4

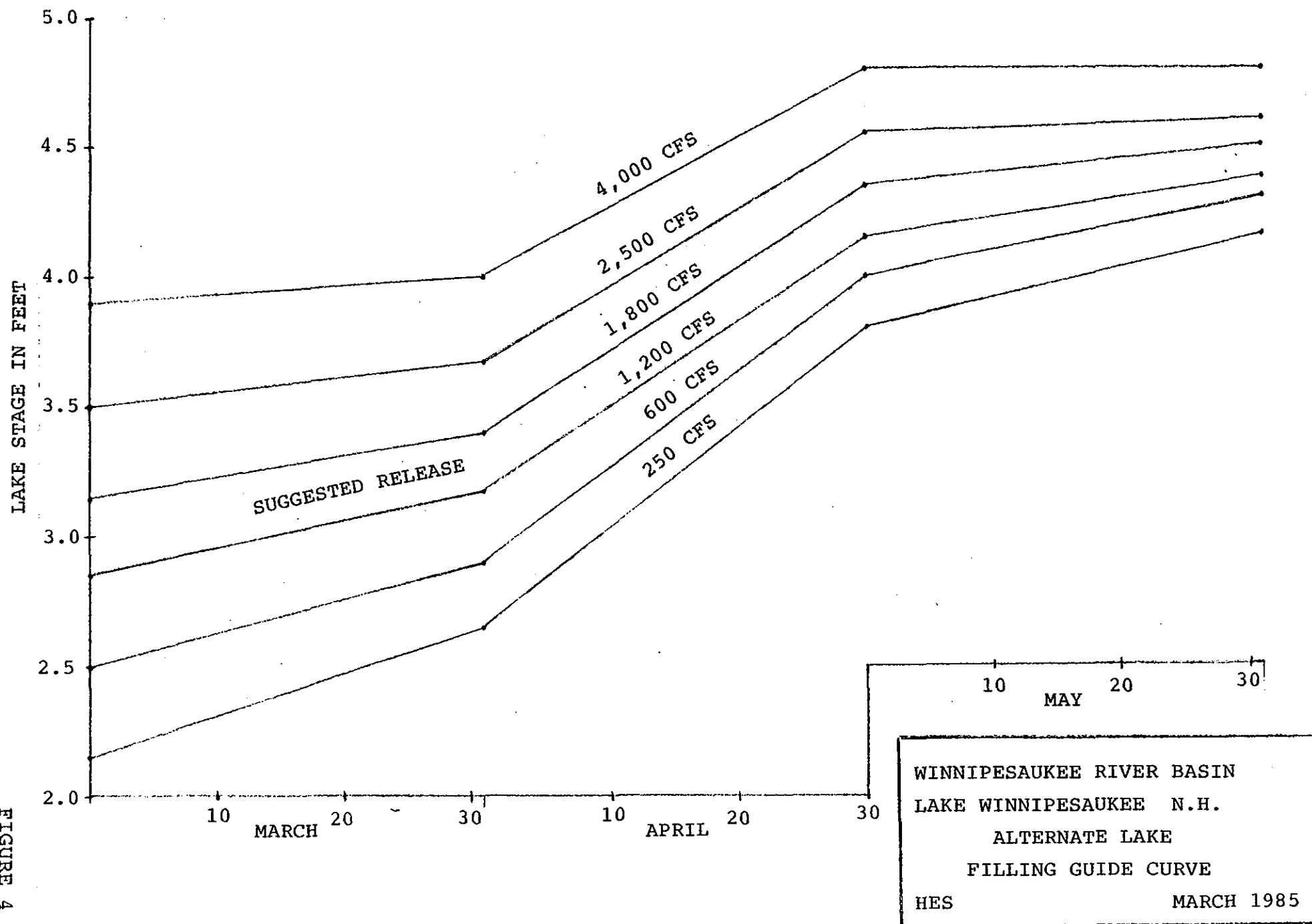
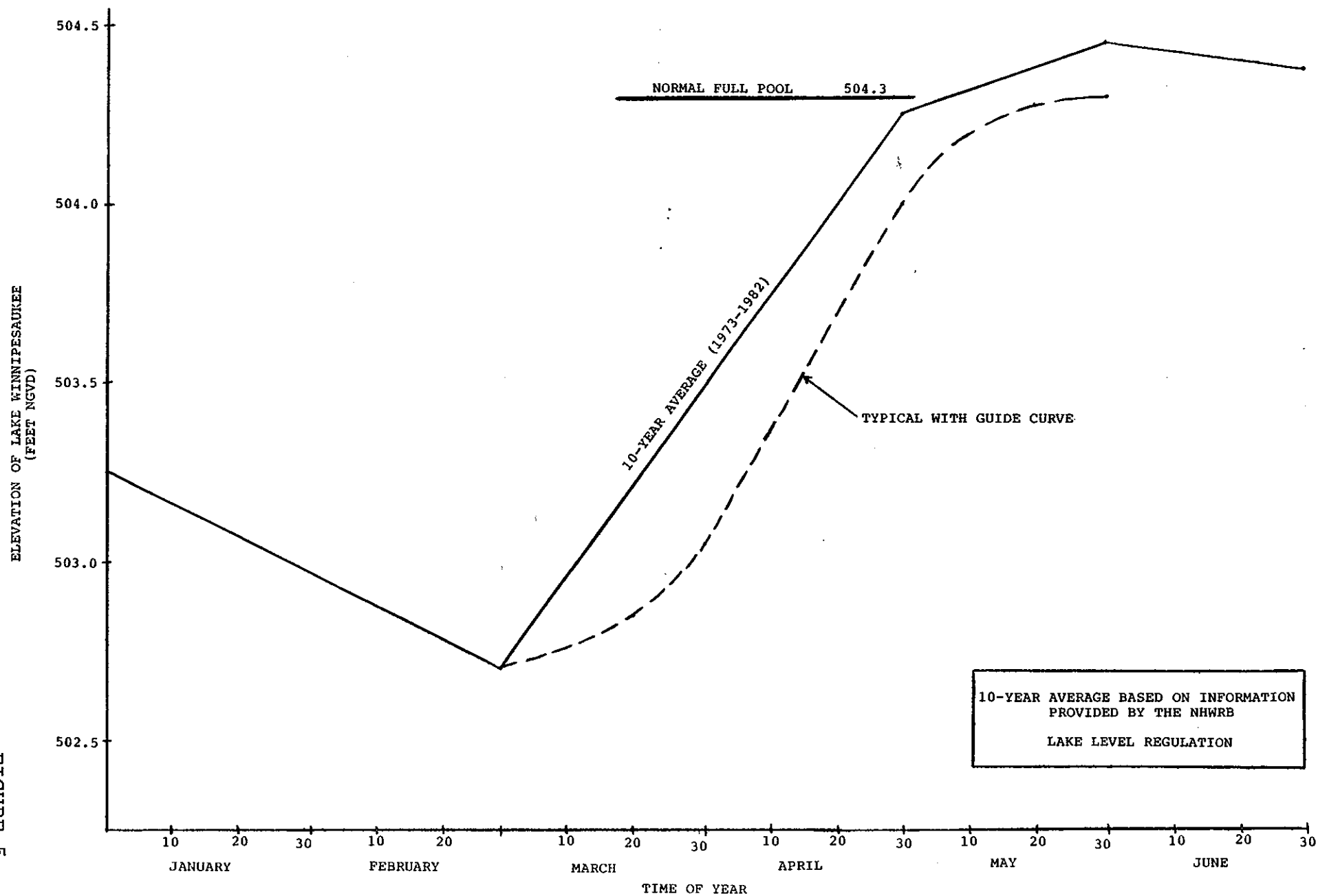


FIGURE 5



without major overbank flooding. There are, however, reaches such as Silver Lake where this flow causes some flood damages.

Lakeport Dam is capable of discharging flows of 4,000 cfs from Lake Winnepesaukee. These flows can be expected if lake levels rise significantly and threaten to overtop Lakeport Dam. At this point, the NHWRB would open all gates to protect the integrity of the dam. This increased discharge would result in additional downstream flood damages. The floods of May 1954, March 1936, and July 1973 were all the result of two rainfall events which occurred a few days apart. With discharges limited to 2,600 cfs the NHWRB was unable to lower lake levels after the first storm to prepare for the second. During periods of high flood potential on the lake, the NHWRB has indicated that the ability to discharge 4,000 cfs safely, would significantly reduce the potential of flood damages to lakefront and riverfront properties.

To achieve 4,000 cfs discharge capability, channel modifications would be required in several restricted reaches along the Winnepesaukee River. The Winnepesaukee River was divided into six damage reaches, which are shown on Plates 2 thru 12. Channel modifications to increase the carrying capacity of the river were considered in each of these reaches. All of these modifications are required to obtain the desired channel capacity.

Reach 1 - Franklin. The city of Franklin is situated on the lower reaches of the Winnepesaukee River. The J.P. Stevens Company Dam and a build up of sediments under Daniell Bridge restrict high flows and increase flood stages in this area. The resultant flood damages occur in the industrial, commercial, and residential properties along the river. Measures to reduce the risk of future flooding in this reach would include removal of sediments under Daniell Bridge and lowering the crest elevation of J.P. Stevens Company Dam 2 feet and adding 2 feet higher flashboards.

During our public involvement program, several people questioned the need to modify the J.P. Stevens Company Dam. Many felt that the recent improvements to this dam, including the addition of a new penstock, were sufficient to handle increased floodflows. Lowering the crest elevation of J.P. Stevens Company Dam two feet would allow this structure to pass an additional 1,400 cfs of flows without increasing upstream flood stages. The new penstock only allows an additional 560 cfs of flows to be diverted around the dam.

Reach 2 - Tilton. Damage reach 2 is located in the Tilton/Northfield central business area. This reach is congested with five bridges and one dam. Four of these bridges do not create any serious flooding problems. However, the State-owned railroad bridge just downstream of Park Street, with its numerous piers, often blocks debris during flood flows. Removal of the existing piers and construction of 2 new piers and bridge deck would be required to reduce flood stages in this reach.

channel between Opechee Bay and Avery Dam. Widening of the channel is not feasible because of the close proximity of buildings on both sides of the river. A possible solution is to deepen 2,800 feet of the channel from Avery Dam to just downstream Messer Street Bridge.

Reach 6 - Lakeport. Damage reach 6 runs from Lakeport Dam upstream through Paugus Bay to just downstream of Route 3. Lakeport Dam controls the level of Lake Winnepesaukee and is capable of discharging flows in excess of 4,000 cfs. However, restrictions immediately upstream of the dam, specifically the massive center pier of Gold Street Trestle Bridge, the USGS measuring weir, and a build-up of sediments; physically curtail these discharges. To alleviate these restrictions, about 900 feet of channel extending upstream from Elm Street Bridge would have to be enlarged, the USGS weir would be removed, and the center pier of the Gold Street Trestle Bridge would be replaced with a smaller pier.

Increased discharges from Lakeport Dam with channel modifications has an estimated first cost of \$5,540,000, and was determined to be economically justified.

Lakeport Dam would have to be modified, along with most of the other dams located on the Winnepesaukee River, to obtain greater than 4,000 cfs discharge capacity. This plan would not be justified and does not warrant further consideration.

In lieu of channel modifications, the option of floodproofing structures along the Winnepesaukee River that would be subject to additional flood losses due to increased discharges from Lakeport Dam was also investigated. Damage surveys identified a total of 550 flood prone structures along the Winnepesaukee River. Floodproofing measures considered included raising structures above expected flood heights, relocating basement utilities to a first floor addition, and waterproofing buildings by closing door and window openings either permanently or temporarily with flood shields. Table 7 compares the cost of floodproofing measures to those of channel modifications. All costs include 25 percent contingencies.

TABLE 7  
FLOODPROOFING MEASURES VS. CHANNEL MODIFICATIONS

<u>Damage Reach</u>	<u>Number of Flood Prone Structures</u>	<u>Cost of Floodproofing Measures</u>	<u>Cost of Channel Modifications</u>
1	16	\$300,000	\$154,000
2	44	515,000	838,000
3A	93	1,200,000	1,808,000
3B	329	Too Costly	32,000
4	27	470,000	443,000
5	41	760,000	759,000
6*	880	Too Costly	\$156,000

\* Damage Reach 6 includes Paugus Bay and Lake Winnepesaukee



Floodproofing measures were eliminated from further investigation in Reaches 1, 3B, 4, 5, and 6 because the estimated cost of these measures exceeded the cost of channel modifications. Floodproofing measures in Reach 2 are only effective for protecting about half of the flood prone structures in this area. Many of those not practical to protect with floodproofing measures are located right on the riverbank, several of which extend out over the water. Floodproofing these structures would be extremely difficult and costly because of restricted access and required construction in the river. Several other buildings in this same reach are on the National Registry of Historic Places. The age and condition of these buildings render them virtually impossible to raise without causing structural damage or waterproof because they can not withstand the hydrostatic pressures that would be exerted on them during flooding conditions. Although less expensive, floodproofing measures would only protect about half of the structure in Reach 2 and are, therefore, not as effective in reducing flood damages as channel modifications. For this reason, floodproofing measures in Reach 2 do not warrant further investigation.

Additional studies were made to determine the estimated annual benefits of floodproofing structures in Reach 3A. Of the 93 structures investigated in this reach, 47 would require floodproofing to provide a comparable level of protection to that provided by channel modifications. These measures would involve raising 36 structures and providing 11 others with utility room additions at an estimated cost of \$1,200,000. The reduction in annual flood losses attributed to these measures is estimated to equal \$11,100. Floodproofing measures were again not as effective as channel modifications which would provide a reduction in annual flood damages totaling \$21,900.

Floodproofing measures generally do not provide as many benefits as channel modifications because flood waters are not confined to the river. During flood events water would still overflow its banks surrounding many of the floodproofed structures. Utilities would then have to be temporarily shut off and residents evacuated. Damages to items outside floodproofed structures such as garages, utilities, and landscaping would still occur. In addition, clean-up would be necessary after floodwaters receded. The NHWRB would receive strong criticism from downstream communities each time they were forced to release high discharges from Lakeport Dam to protect lakefront properties.

#### Bypasses

Diversion tunnels and surface bypass channels were considered as a means to convey floodwaters from Lake Winnepesaukee around damage sites to downstream locations or other watersheds. The cost of constructing a diversion tunnel, extending from Paugus Bay to the Merrimack River would be about \$280 million and would far exceed expected benefits. Diverting excess floodflows to the Saco or New Hampshire Coastal Watershed was eliminated from further study because these neighboring watersheds could

not handle additional flows without causing severe flood losses. The construction of surface bypass channels to divert floodflows around damage reaches along the Winnepesaukee River would not be economical or practical because of the hilly topography of the watershed.

Land Treatment - Although adopted primarily to further good agriculture and forestry practices, land treatment and watershed management measures have beneficial effects on flood conditions. Modifying or preserving vegetation cover conserves water by increasing infiltration and reducing surface runoff. The effect on flood discharges varies with the watershed, the characteristics of flood producing storms, and antecedent surface conditions. In general, land treatment has a greater effect on preventing flood conditions from worsening as development occurs than on reducing existing flood stages. About 85 percent of the land in the Lakes Region is forest. Treatment of the remaining 15 percent of developed land would have a limited effect on reducing flooding in the Winnepesaukee River Basin. This alternative was eliminated from further consideration. Continued use of this measure by other public and private interests would, however, improve and protect upstream agricultural and forest lands and prevent flood stages from increasing as development occurs.

Levees and Floodwalls - With approximately 210 miles of shoreline surrounding Lake Winnepesaukee, including the shores of major islands, the use of levees and floodwalls to protect lakefront property would not be an economical solution. In addition, a large portion of the region's economy is based on water related activities and both physical as well as visual access to the water is very important. The construction of levees and floodwalls around Lake Winnepesaukee or along the Winnepesaukee River to protect against future flood losses would restrict access to the water and would receive strong opposition from recreational interests. This alternative was eliminated from further consideration.

Channel Modifications - Flows along the Winnepesaukee River consist of discharges from Lakeport Dam and runoff from the intervening drainage area. Under current operating procedures, the NHWRB limits discharges from Lakeport Dam to 2,600 cfs. Generally the Winnepesaukee River can handle this flow and the intervening runoff without major flood losses. Some reaches, such as Silver Lake, experience some flooding. Channel modifications along the Winnepesaukee River would eliminate this flooding, but would do nothing to reduce flooding on Lake Winnepesaukee, which is where the majority of flood losses have occurred in the past. Channel modifications in combination with increased discharges from Lakeport Dam would reduce flood damages to both lakefront and riverfront properties and was determined to be more cost effective than channel modifications alone (see Table 9). Discussion of this alternative is presented at the beginning of this section.

Floodproofing - Damage surveys have identified over 1,400 flood prone structures surrounding Lake Winnepesaukee and along the Winnepesaukee River. Floodproofing this number of structures is estimated to cost over

\$20 million and is not an economical solution to the flood problem. In addition, most floodproofing measures are only effective if the proper emergency measures are taken prior to anticipated flooding. A large number of these structures are summer cottages which are rented out during the recreation season. Because of the transient nature of the people renting these cottages, public education of floodproofing procedures would be very difficult and response to flood warning would most likely be poor. For these reasons floodproofing was not retained as an economical nor practical solution to flooding of lakefront and riverfront property.

Relocation - There are over 1,400 flood prone structures along the Winnepesaukee River and surrounding Lake Winnepesaukee. The cost to relocate this number of structures would exceed any expected benefits. The social and economic impacts of this action would be incalculable as numerous residential, commercial, and industrial buildings are located in this area. This alternative was not considered further.

Land Use Regulation and Zoning - As more of the communities in the Winnepesaukee River Basin join the regular phase of the National Flood Insurance Program, they will have to adopt management regulations which will limit construction within the 100-year flood plain. This will restrict future construction in flood prone areas of the basin and should help to prevent flood conditions from worsening. However, land use regulation and zoning would have little or no effect on reducing existing flood stages and was not selected for additional investigation.

Flood Warning and Emergency Evacuation - A system of forecasting floods and warning residents would protect the lives and enhance the safety of those working and living within flood prone areas of the Winnepesaukee River Basin. Although some property could be moved above expected flood heights, the majority of flood losses would still occur. In addition, the majority of flood prone structures in the basin are summer cottages which are rented out during the recreation season. Because of the transient nature of the people renting these cottages, public education of flood warning and evacuation measures would be very difficult and response to flood warnings would most likely be poor.

Flood Insurance - The National Flood Insurance Program was created by Congress so that property owners in areas subject to flooding would be able to buy insurance at a reasonable cost. In return for this subsidized protection, communities which have identified flood plains must adopt certain minimum measures to help reduce the effects of flooding. A property owner cannot obtain flood insurance unless the community agrees to participate in the Federal program.

A community qualifies for the program in two separate phases, "Emergency" and "Regular". During the Emergency phase, any property owner in the community may purchase limited amounts of flood insurance for a structure and its contents. The same subsidized rate is charged for all structures regardless of flood risks. General guidelines are implemented

by the community to reduce flood losses. A study of the community is performed during this phase, resulting in a detailed flood plain map called a Flood Insurance Rate Map. This map identifies various risk zones and establishes flood elevations which become the minimum building levels for basements of new construction within the mapped areas. The whole program is geared to protect against the intermediate level of flooding known as the "base" or "100-year" flood. This is a flood that has a one percent probability of occurring in any given year.

After the Flood Insurance Rate Map becomes effective, the community must proceed into the Regular Program. At this point, owners of flood prone property become eligible to buy the full limits of flood insurance coverage. Premiums are based on a structure's risk to flooding according to the Rate Map.

As a condition of participation in the Regular phase of the National Flood Insurance Program, the community must require that all new construction, as well as substantial improvements to existing structures, within flood prone areas be elevated or floodproofed against the "100-year" flood. Table 8 updates the participants in the Flood Insurance Program, both the Emergency and Regular phase, as of November 1983.

TABLE 8  
FLOOD INSURANCE PROGRAM, WINNIPESAUKEE RIVER BASIN

<u>COMMUNITY</u>	<u>REGULAR</u>	<u>EMERGENCY</u>	<u>NONE</u>
Alton		X	
Ashland		X	
Belmont		X	
Brookfield	X		
Centre Harbor			X
Franklin	X		
Gilford		X	
Gilmanton			X
Holderness	X		
Laconia	X		
Meredith		X	
Middleton			X
Moultonboro			X
New Durham		X	
New Hampton		X	
Northfield	X		
Ossipee		X	
Sanbornton	X		
Sandwich		X	
Tamworth		X	
Tilton	X		
Tuftsboro		X	
Wolfeboro		X	

Flood insurance provides a method of reimbursement for most losses incurred as a result of flooding. Because flood insurance is presently available in many of the communities along the Winnepesaukee River and surrounding Lake Winnepesaukee, it is part of the "without project condition" and was not studied further. Purchasing flood insurance is recommended in the absence of a plan that reduces actual damages.

#### COMPARISON OF ALTERNATIVES

Comparison of alternatives resulted in the designation of the plan involving the modification of existing spring fill-up and fall draw-down schedules of Lake Winnepesaukee in combination with increased discharges from Lakeport Dam and channel modifications as the NED<sup>1</sup> plan, because it maximizes net benefits (see Table 9).

#### CONCLUSION

Through comparison of alternatives the plan involving the modification of existing spring fill-up and fall draw-down schedules of Lake Winnepesaukee in combination with increased discharges from Lakeport Dam and channel modifications, was selected for detailed analysis. This plan was determined to maximize net benefits. It also addresses the problems and opportunities of the basin and is acceptable to members of the NHWRB (see letter from NHWRB dated 13 November 1984 contained in Appendix A).

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<sup>1</sup>NED (National Economic Development) contributions are increases in the value of the national output of goods and services.

TABLE 9  
COMPARISON OF ALTERNATIVES  
(March 1985 Price Level)

<u>PLAN</u>	<u>First Cost</u> (\$1,000)	<u>Annual Benefits</u> (\$1,000)	<u>Net Benefits</u> (\$1,000)	<u>Benefit to Cost Ratio</u>
RESERVOIRS				
(1) Lower Normal Full Pool	Not Acceptable			
(2) Modify Spring Fill-Up Schedule	0	2,692.7	2,692.7	---
(3) Modify Fall Draw-down Schedule	0	0	0	---
(4a.) Increase Discharges from Lakeport Dam	0	1,608.5	1,608.5	---
(4b.) Increase Discharges from Lakeport Dam with Channel Modifications	5,540	3,163,700	2,665	6.3 to 1
BYPASSES				
(1) Tunnel	280,000	5,116.1	---	.22 to 1
(2) Overland Bypass	Not practical			
LAND TREATMENT	Not Effective			
LEVEES & FLOODWALLS	Not Acceptable			
CHANNEL MODIFICATIONS	5,540	900.2	401.5	1.8 to 1
FLOODPROOFING	Not Effective			
RELOCATION	Not Acceptable			
LAND USE REGULATIONS & ZONING	Not Effective			
FLOOD WARNING & EMERGENCY EVACUATION	Not Effective			
FLOOD INSURANCE	Existing Condition			
COMBINATION PLAN (Modify Spring Fill-up & Fall Draw-down Schedules & Increase Discharges from Lakeport Dam with Channel Modifications)	5,540	3,639.7	3,141	7.3 to 1

## V. SELECTED PLAN

### DESCRIPTION

The selected plan consists of modifying the existing spring fill-up and fall draw-down schedules of Lake Winnepesaukee in combination with the construction of a system of channel modifications along the Winnepesaukee River that will allow increased discharges from Lakeport Dam.

#### Proposed Spring Fill-Up Schedule

Through analysis of historic runoff data, a set of guide curves has been developed that will help reduce the risk of premature filling of the lake during the spring fill-up period, without significantly increasing the risk of not reaching a full pool by June 1. The guide curves (see Figure 4), when tempered by the NHWRB's years of experience, can be used to obtain a gradual filling of the lake assuring both a full pool by the start of the recreation season and a significant amount of storage for flood waters during the spring fill-up period. Figure 5 shows the amount of additional storage that can be obtained in the spring by adoption of the guide curves.

#### Proposed Fall Draw-Down Schedule

The proposed fall draw-down schedule can be adopted at no cost and would provide additional storage in the lake for flood water, reducing the risk of flooding during the fall.

#### Channel Modification

Construction of proposed channel modifications would allow the NHWRB to release discharges of up to 4,000 cfs from Lakeport Dam. Discharges are currently limited to about 2,600 cfs because of downstream channel restrictions. The ability to release greater discharges from Lakeport Dam would enable the NHWRB to better regulate lake levels, especially during extended periods of rainfall. This will reduce the risk of future flood damages to lakefront and riverfront properties. Proposed channel modifications are summarized in the following table and are shown on Plates 2 thru 12.

Streambed profiles were based on flood insurance studies and the series of probes and borings taken by the Corps of Engineers during November 1983. Flood insurance studies were performed by Anderson-Nichols & Co., Inc. and Hamilton Engineering Associates, Inc. in 1977 and 1978 for the communities of Franklin, Northfield, Laconia, and Tilton. Detailed surveys of each reach will be performed during preparation of plans and specifications to verify the extent and quantity of excavation needed.

TABLE 10  
PROPOSED CHANNEL MODIFICATIONS

Reach

1 - Franklin

- Remove approximately 3,200 cubic yards of material from under Daniell Bridge
- Lower J.P. Stevens Dam 2 feet and add new flashboard system

2 - Tilton/Northfield

- Remove approximately 30,000 cubic yards of material from the center portion of the channel between the railroad bridge downstream of Park street and the railroad bridge upstream of Tilton Island (a distance of about 2,300 feet).
- Replace piers and decking of State-owned railroad bridge located just downstream of Park Street.

3A - Silver Lake

- Remove approximately 38,600 cubic yards of material from the center portion of the channel between the outlet of Silver Lake and Interstate 93 (a distance of about 6,000 feet).
- Construct bottom-hinged gate approximately 140 feet downstream of Route 140 Bridge.

3B Lochmere

- Remove approximately 3,500 cubic yards of material from the center portion of the channel between the outlet of Winnisquam Lake and Union Road (a distance of about 800 feet).

4 - Laconia (downstream of Avery Dam)

- Remove approximately 19,000 cubic yards of material from the center portion of the channel between Avery Dam and the inlet of Winnisquam Lake (a distance of about 2,860 feet).

5 - Laconia (upstream of Avery Dam)

- Remove approximately 50,000 cubic yards of material from the center portion of the channel between Messer Street Bridge and Avery Dam (a distance of about 2,800 feet).
- Floodproof one commercial building and provide ten raised utility rooms.

6 - Lakeport

- Remove approximately 11,000 cubic yards of material from the center portion of the channel between the railroad bridge and Elm Street Bridge (a distance of about 900 feet).
- Replace massive center pier of Gold Street Trestle Bridge with smaller pier.
- Remove USGS Gaging Station.



Local officials were contacted to research utility crossings along the Winnepesaukee River. Additional research and field verification is required during preparation of plans and specifications to determine the exact location of utilities and the amount of cover material. Utilities with insufficient cover material or that restrict river flows will require relocation. It was assumed that approximately half of the crossings in proposed work areas will require relocation or termination at an estimated cost of \$150,000.

Flows along the Winnepesaukee River are recorded by the USGS at the outlet of Paugus Bay in Lakeport and just downstream of Tilton Island in Tilton. The proposed project would include complete removal of the USGS gage in Lakeport and channel excavation at the Tilton Gage. The NHWRB plans to install a new gaging system in Lakeport. The gage in Tilton would have to be recalibrated after completion of the project to reflect the new channel's hydraulic characteristics.

River velocities were calculated at various locations along the river under existing and proposed conditions. In areas of proposed work where changes in river velocities are significant and might cause erosion, rip-rap protection would be provided. These areas are shown on Plates 6, 7, and 10. Channel modifications may cause changed hydraulic conditions in areas outside of the project limits, possibly resulting in increased erosion. The local sponsor would be required to provide any additional protection that is necessary outside of proposed work areas. Details pertaining to riprap protection requirements are contained in the Geotechnical Appendix of the supporting document.

The NHWRB is willing to regulate river flows downstream of Lakeport Dam to accommodate excavation operations. Reduced flows would allow the use of land tracked equipment in all areas except Reach 6. The depth of water in Reach 6 would require the use of a barge or drag line. Excavation work in Reaches 2, 3A, and 4 would be accomplished between July and September to minimize adverse impacts to trout and small mouth bass spawning areas. Work in other reaches would be performed between July and November.

Sediment analysis of samples taken in areas of proposed dredging determined that this material is predominantly of large grain size which should settle out of suspension before entering downstream systems.

Excavated material would be temporarily stockpiled in or near the river and allowed to drain before transporting to designated disposal areas. Physical testing of sediment samples indicates that 1 day is sufficient time to dewater excavated material. The NHWRB will be responsible for designating disposal sites capable of handling approximately 155,300 cubic yards of excavated material. The NHWRB has located suitable disposal sites at nearby landfills and are also investigating the possibility of selling excavated material to reduce the non-Federal share of project costs.

Sediment analyses of samples taken in areas of proposed dredging have indicated that the existing river bottom material is predominantly sands and gravels. Moderate amounts of organics and contaminant metals were detected in two samples taken just upstream of Church Street Bridge in Laconia. This may cause anaerobic conditions to develop if these sediments are disposed of in an area where there is moisture. Materials excavated from this area should be disposed of at a suitable upland site.

Through coordination with the U.S. Fish and Wildlife Service, N.H. Fish and Game Department, and the N.H. Historical Preservation Commission several environmentally-oriented elements of good design have been incorporated into the selected plan to minimize adverse affects on recreational, environmental, and archaeological resources within the basin. These measures include:

(1) A bottom-hinged gate would be constructed about 140 feet downstream of the Route 140 Bridge to prevent a reduction of water levels in Silver Lake and Tioga Wetland after channel restrictions are removed in this reach.

(2) In Reaches 2, 3A, and 4 an assortment of rocks and boulders would be placed on the channel bottom after excavation to restore fish habitat. Restoration activities would be monitored by representatives of the NH Fish and Game Department and the Corps.

(3) Channel work would be restricted to the streambed and access areas to minimize disturbance of streambank vegetation. Access would only be provided in areas which are already disturbed.

(4) In Reaches 2, 3A, and 4 channel work would be performed between July and September to minimize impacts on fish spawning areas. Work in other reaches could be performed between July and November.

(5) In Reach 6, boulders from an old stone crib that would be removed during excavation would be placed in Paugus Bay to provide fish habitat.

(6) The effects of suspended sediments on downstream benthos and other aquatic life would be minimized by restricting construction activities to low flow periods, the use of sediment controls such as silt fences, and the operation of the dams along the Winnepesaukee River to regulate flows in the work area.

(7) In Reach 4 only the channel on the west side of Eager Island would be excavated to minimize adverse impacts on wetland habitat in this area.

(8) In Reach 3B rubber mats would be placed in the access area at Union Road to avoid possible disturbance of adjacent archaeological sites. In addition, rubber tired equipment would be used for channel excavation in this reach.

(9) Construction of proposed channel modifications may result in the removal of a portion of the archaeological resources in Reach 3B. Any archaeological sites to be disturbed would be excavated and recorded.

These environmentally-oriented elements of good project design have been coordinated with US Fish and Wildlife Services, NH Fish and Game Department, NH Historic Preservation Commission, and the Advisory Council on Historic Preservation. Coordination with these agencies will be maintained throughout preparation of plans and specifications and project construction.

#### COSTS

Modifications to the present regulation of Lake Winnepesaukee can be implemented at no cost. The estimated first cost of proposed channel modifications and floodproofing measures are shown in the following table.

TABLE 11  
FIRST COSTS OF SELECTED PLAN  
(March 1985 Price level)

<u>Channel Modifications</u>	<u>Estimated First Cost</u>
Reach 1 - Franklin	\$123,200
Reach 2 - Tilton/Northfield	670,000
Reach 3A - Silver Lake	1,445,900
Reach 3B - Lochmere	25,000
Reach 4 - Laconia (downstream of Avery Dam)	354,000
Reach 5 - Laconia (upstream of Avery Dam)	415,000
Reach 6 - Lakeport	125,000
	<u>\$3,158,100</u>
<u>Floodproofing Measures</u>	
Reach 5 - Laconia (upstream of Avery Dam)	191,500
Subtotal	<u>\$3,349,600</u>
Contingencies	840,400
Lands and Damages	200,000
Utility Relocations	150,000
TOTAL CONSTRUCTION COST	<u>\$4,540,000</u>
Engineering & Design	600,000
Supervision & Administration	<u>400,000</u>
TOTAL FIRST COST	<u>\$5,540,000</u>

#### PROJECT OPERATION

The NHWRB would continue to regulate lake levels and riverflows within the Winnepesaukee River Basin. Their regulation procedures would be

modified to incorporate proposed spring fill-up and fall draw-down schedules. These changes would provide additional flood storage in Lake Winnepesaukee during the spring and fall without adversely impacting recreation, hydropower generation, the environment and other water related resources. The proposed project would also involve the construction of channel modifications along the Winnepesaukee River which would allow the NHWRB to release greater discharges from Lakeport Dam improving their ability to regulate lake levels and riverflows.

Upon completion, the project is turned over to the local sponsor(s) as their responsibility to operate and maintain. The project is designed to be complete within itself and does not commit the Federal Government to any future work.

Following construction of the project, an Operation and Maintenance Manual will be prepared by the New England Division and forwarded to the responsible parties. This manual will reflect the project features, as actually built, and provides direction regarding their proper operation and maintenance.

It should be noted that estimated operation and maintenance costs, included herein, are provided for economic analysis only and are not included in project first costs. The local sponsor(s) should be aware that their responsibility includes future funding of all operation and maintenance items which should be budgeted for accordingly.

The completed project will be inspected semi-annually by personnel from the New England Division, together with the responsible parties, to insure proper operation and maintenance as prescribed by the Secretary of the Army.

After completion of the proposed project, its effectiveness depends upon the proper operation of the state and privately owned dams along the Winnepesaukee River. The local sponsor(s) would be required to insure proper operation of these dams during times of flooding. This includes the operation of the proposed hinged gate structure. The NHWRB has regulatory authority over dam operation procedures along the Winnepesaukee River and would be the most logical agency to assume this responsibility. State legislation also provides the NHWRB with the authority to direct dam operators during periods of high flows along the Winnepesaukee River to take whatever actions the NHWRB deems necessary to reduce the risk of flood losses. The NHWRB maintains a list of telephone numbers for warning dam operators along the Winnepesaukee River of potential flooding conditions to allow them adequate time to perform the necessary emergency measures.

The local sponsor(s) would be required to maintain channel modifications after project completion. This would involve periodic channel work to remove any newly collected sediments that infringe upon the carrying capacity of the channel and reduce the effectiveness of the project.

Although it is impossible to predict exactly where and how often channel maintenance will be required, it is possible to identify potential problem areas through analysis of estimated river velocities and existing channel bottom conditions. Sediment accumulation usually occurs in areas where there are sudden decreases in river velocities, which cause sediments to drop out of suspension. This generally occurs at the inlet of lakes and in ponding areas just upstream of dams. It is not expected that future channel maintenance will be required along Reaches 2, the lower portion of 3A, 3B, and most of 4 because river velocities in these areas are sufficient to carry sediments downstream. This is evident by the rocky river bottom in these areas. Future maintenance dredging is expected to be required at the inlet of Winnisquam Lake and just upstream of Lakeport, Avery and Lochmere Dams and the proposed bottom-hinged gate. The city of Laconia periodically removes sediment accumulations at the inlet of Winnisquam Lake and dredging just upstream of the three existing dams is part of the normal operation and maintenance of these structures. Periodic channel maintenance after project construction is not expected to be much greater than under existing conditions. The need for periodic channel work would also depend upon the rate of sediment flow into the river, the frequency of future flooding, and dam operation procedures. The rate of sediment flow is largely effected by development within the basin. The dams along the Winnepesaukee River can be operated at full capacity periodically to reduce the rate of sediment built-up just upstream of these structures.

Areas of proposed riprap protection would require periodic maintenance to control vegetation and replace any rocks that are dislodged by flooding, vandalism, or other means.

Operation and maintenance costs are estimated at \$5,000 annually.

#### PLAN ACCOMPLISHMENTS

The selected plan would reduce average annual flood losses within the Winnepesaukee River Basin by nearly four million dollars through the use of structural and non-structural measures.

The selected plan establishes an operation procedure for the regulation of Lake Winnepesaukee. The spring fill-up guide curves can be used to obtain a gradual filling of the lake starting March 1, assuring both a full pool by June 1 and a significant amount of storage for flood waters during spring runoff. The proposed fall draw-down schedule would provide storage for flood waters during the later portion of the hurricane season. It would also allow time in the fall for lakefront property owners to make repairs to their walls and beaches and provides more gradual releases in the fall and winter months to augment hydropower generation. Channel modifications would allow the NHWRB to release greater discharges from Lakeport Dam. This would improve their ability to regulate lake levels and riverflows, and achieve a better balance among recreation, hydropower, and flood control interests in the basin.

## PROJECT EFFECTS

Impacts of varying magnitude and longevity can be expected during two phases of project implementation: construction and post-construction. Impacts likely to occur during construction of the project are generally short-term and site-specific. Post-construction impacts are generally long-term and are expected to extend over the life of the project and may have regional as well as site-specific implications.

### Short-Term Impacts

Dredging activities would increase turbidity and siltation of the river. These effects would be short-term and site-specific, occurring only in work areas during project construction.

The aesthetics of work areas would be affected temporarily by the presence of construction equipment. Noise and dust pollution associated with construction activities would be temporary. There would also be temporary disruption to traffic during construction with increased congestion in the area. Benthic organisms in the streambed would be removed and/or buried by the proposed work. Recolonization would take place during the following growing season.

Fish habitat would be disturbed in areas of proposed channel excavation. Placement of rocks and boulders on the channel bottom after excavation will help to restore fish habitat. This has proven effective in similar projects throughout the country.

A positive impact of the plan would be the influx of temporary workers who would purchase goods and services thereby stimulating the local economy.

### Long-Term Impacts

The most significant impact of the selected plan would be the substantial reduction of future flood losses to lakefront and riverfront properties in the basin. It is estimated that the proposed project would reduce average annual damages in the basin by approximately 75 percent.

Channel excavation will provide greater access by canoe for hunting, fishing, and general enjoyment of the natural environment.

Gradual draw-down and fill-up of Lake Winnepesaukee will provide more uniform releases from Lakeport Dam for greater hydropower generation.

Construction of proposed channel modifications may result in the possible removal of a portion of the archaeological resources in the Lochmere Archaeological District. Any archaeological sites disturbed would be mitigated by excavating and recording prior to project construction.

Table 12 shows the effects of the selected plan on resources of principal national recognition. Detailed assessment of environmental impacts resulting from the implementation of the selected plan are contained in the Environmental Assessment portion of the Winnepesaukee River Basin Detailed Project Report.

TABLE 12  
EFFECTS OF THE SELECTED PLAN ON NATIONAL RESOURCES

<u>Types of Resources</u>	<u>Principal Sources of National Recognition</u>	<u>Measurement of Effects</u>
Air Quality	Clean Air Act, as amended (42 U.S.C. 1875h-7 et seq.)	Temporary and minimal air quality degradation at immediate construction sites within less than 1 square mile area.
Areas of Particular Concern Within the Coastal Zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.)	Not applicable. The study area does not include any coastal zone areas.
Endangered and Threatened Species.	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	None identified as being present in the study area. No effect.
Fish and Wildlife Habitat.	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	No loss of wildlife habitat. Wetland habitat would be protected. Fisheries habitat would be restored in these reaches along the river. Riparian habitat preserved by reduction of flood flows.
Floodplains	Executive Order 11988, Flood-plain Management.	Future development in the flood-plain would not result from construction of the proposed project.
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec. 470 et seq.)	Some historic resources may be impacted in the Lochmere Archaeological District. An archaeological survey will be undertaken to precisely locate any prehistoric or historic resources present and to determine their significance. Archaeological data recovery would be performed as mitigation for any significant resources within the affected areas.
Prime and Unique Farmland	CEQ Memorandum of 1 August 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	Not present in study area.
Recreational Resources	Federal Water Project Recreation Act, as amended (16 U.S.C. 4601-12 et seq.)	Recreational opportunities would be enhanced due to the reduction of flooding along the shoreline. Channel excavation would provide adequate depths during low flows for canoeing activities along the center portion of the Winnepesaukee River.
Water Quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	Temporary turbidity and siltation. State water quality classifications would not be affected.
Wetlands	Executive Order 11990, Protection of Wetlands, Clean Water Act of 1977, as amended (42 U.S.C. 1857h-7 et seq.)	Wetlands would be preserved in the study area. No direct effects on wetlands would result due to construction activities.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.)	The Winnepesaukee River is not designated or proposed for designation as a Wild and Scenic River.



## ECONOMIC EVALUATION

As shown in Table 11, the total estimated first cost of the selected plan equals \$5,540,000. Amortizing this cost over 50 years at an 8-3/8 percent interest rate, results in an annual cost of \$498,700. This includes operation and maintenance costs. The estimated annual costs of the selected plan are shown in Table 13.

TABLE 13  
ESTIMATED ANNUAL COST OF SELECTED PLAN

Channel Modifications (\$5,540,000 X .08527)	=	\$472,400
Interest During Construction (\$250,000 x .08527)	=	21,300
Operation & Maintenance	=	<u>5,000</u>
<b>TOTAL ANNUAL COST</b>		<b>\$498,700</b>

Benefits accrued from implementation of the selected plan total \$3,639,700 and are shown in Table 14.

TABLE 14  
ANNUAL BENEFITS OF SELECTED PLAN

Modify Spring Fill-Up Schedule	\$2,692,700
Modify Fall Draw-down Schedule	0
Increase Discharges From Lakeport Dam with Downstream Channel Improvements	<u>947,000</u>
<b>TOTAL</b>	<b>\$3,639,700</b>

The results of an economic analysis of the selected plan are summarized in Table 15.

TABLE 15  
ECONOMIC ANALYSIS OF SELECTED PLAN

	<u>First</u> <u>Cost</u>	<u>Annual</u> <u>Cost</u>	<u>Annual</u> <u>Benefits</u>	<u>Net</u> <u>Benefits</u>	<u>B/C</u> <u>Ratio</u>
Selected Plan	\$5,540,000	\$498,700	\$3,639,700	\$3,141,000	7.3 to 1

## COST APPORTIONMENT

The selected plan of flood loss reduction was recommended for construction under Section 205 of the Continuing Authorities Program. Under this authority, local interests are required to provide all lands, easements, rights of way, utility relocations, and bridge modifications necessary for the construction of structural measures such as proposed channel work. Local interests are also required to provide 20 percent of the total first cost of all nonstructural measures such as proposed floodproofing, in accordance with Section 73 of PL 93-251. In addition,

local interests are responsible for all costs in excess of the Federal cost limit, which is \$4,000,000 under Section 205 Authority. Table 16 shows a breakdown of traditional cost sharing requirements.

TABLE 16  
TRADITIONAL COST-SHARING, SELECTED PLAN

	<u>Cost</u>
FEDERAL	
Cost Limit	\$4,000,000
NON-FEDERAL	
Lands, Easements, and Rights of Way	\$200,000
Utility Relocations	150,000
Bridge Modifications	20,000
Floodproofing Measures (20 Percent)	46,000
Costs in Excess of Federal Limit	<u>1,124,000</u>
Total Non-Federal Cost	<u>\$1,540,000</u>
 TOTAL FIRST COST	 \$5,540,000

The administration is reviewing project cost sharing and financing across the entire spectrum of water resource development functions. The basic principle governing the development of specific cost-sharing policies is that whenever possible the cost of services produced by water projects should be paid for by their direct beneficiaries. It also is recognized that the Federal government can no longer bear the major portion of the financing of water projects. New sources of project financing, both public and private will have to be found.

Operation and maintenance costs are the responsibility of local interests and are currently estimated at \$5,000 annually.

## VI. PLAN IMPLEMENTATION

During feasibility studies, it was determined that the selected plan could best be implemented under Section 205 of the Continuing Authorities Program. During June 1985, the Winnepesaukee River Basin Detailed Project Report was submitted to the Chief of Engineers. This report recommends that the selected plan of flood loss reduction measures be authorized for construction as a Federal project under Section 205. Projects within this program may be authorized for construction directly by the Secretary of the Army acting through the Chief of Engineers.

Following the review and approval of the Winnepesaukee River Basin Detailed Project Report by the Office of the Chief of Engineers, plans and specifications for constructing channel modifications and floodproofing buildings along the Winnepesaukee River would be prepared by the New England Division. At this same time, a formal document would be required from the State of New Hampshire reaffirming their intent to support the selected plan and fulfill the requirements of local cooperation. Following the receipt of this formal document and the allocation of Federal construction funds, bids would be invited for the award of a contract. It is estimated that with timely approval of the proposed project by the Office of the Chief of Engineers, the project could begin construction in 1987. It is anticipated that all work involved with the proposed project can be accomplished in three construction seasons. Upon completion of the proposed project, the State of New Hampshire would be responsible for its operation and maintenance.

## VII. SUMMARY OF PUBLIC COORDINATION

Close coordination with the public was maintained throughout the study. Frequent meetings were held with members of the New Hampshire Water Resources Board and its Winnepesaukee River Basin Study Committee to discuss various flood control alternatives and to receive their comments.

A public meeting was held on 22 August 1984 to present the proposed plan and to give those attending the opportunity to express their views. Almost everyone who commented on the proposed project questioned its cost, its impact on the river and lakes, and its effectiveness to reduce the threat of future flood losses. Many of those attending doubted that anything would ever be constructed or that the non-Federal interests could ever come up with their share of project costs.

As a result of the number of concerns raised at the August meeting, the NHWRB began meeting with State and local officials to explain the proposed project in greater detail and to address their concerns. The first of these meetings was held on 19 September 1984, in Tilton, New Hampshire, where approximately forty State and community officials attended. Most were very pleased with the format of the smaller meeting and commented afterwards that they had a better understanding of the proposed project and that their concerns were adequately addressed.

A similar meeting was held on 27 September 1984 in Concord, New Hampshire. Officials from eight State agencies attended this meeting, most of which expressed strong support for the project.

During December 1984, over 200 draft copies of this report were distributed to other Federal, State, and local agencies for public review. This gave all interested parties the opportunity to comment on the findings of our study. During the public review period we received several letters of support along with several others that raised questions and concerns about the findings of our study. These letters, along with our responses, are contained in Appendix A.

A public meeting was held on 21 January 1985 by the NHWRB to address concerns raised during the public review period. New England Division staff members were invited to assist the NHWRB. About 50 people attended this meeting. Four individuals and a representative of the New Hampshire Fish and Game Department spoke out in opposition to channel modifications because of adverse environmental impacts. All others who spoke, including several hydropower developers, expressed support for the proposed project.

Following the public review period, we received a letter of support from Governor Sununu, dated 12 March 1985. The Governor's letter also contained several concerns regarding non-structural alternatives, preservation of archaeological sites, utility relocation costs, and environmental concerns raised by the New Hampshire Fish and Game Department.

Non-Structural alternatives have been examined in detail. In fact, 85 percent of the total benefits that are expected to result from implementation of the recommended plan, are attributed to non-structural changes in the present regulation of Lake Winnepesaukee.

The New Hampshire State Historic Preservation Officer (SHPO), did not provide a statement of potential concerns until three weeks after the close of our 60 day comment period, which ended 1 March 1985. Fortunately we were aware of many of the concerns raised by the SHPO in his letter of 6 May 1985; such as the J.P. Stevens Dam, Lochmere Archaeological District, and Route 140 Bridge area; through coordination with Dr. Humes of the SHPO staff and Ms. Justine Gengras of the Tilton Conservation Commission. Archaeological concerns in these areas are address in this report. The remaining archaeological concerns expressed by the SHPO were not brought to our attention until well after the 60-day comment period had ended. These conerns will be addressed during the preparation of plans and specifications. We will continue our efforts to coordinate with the SHPO throughout additional cultural resource studies to ensure that all archaeological concerns are adequately addressed.

Utilitly relocation costs were based on available information obtained from local city and town engineers and the State of New Hampshire Water Supply and Pollution Control Commission. Detailed surveys are required to determine a more accurate estimate of utility relocation costs. This work is scheduled to be performed during preparation of plans and specifications.

Concerns raised by the New Hampshire Fish and Game Department in their letter of 25 February 1985, are addressed in our response of 25 April 1985 (see Appendix A).

The State of New Hampshire has appropriated \$400,000 to repair the railroad bridge just downstream of Park Street in Tilton. A bill to appropriate \$900,000 has been deferred until a final project cost estimate has been prepared. The State's efforts to appropriate project funds demonstrates their strong support for the proposed project and their willingness and ability to cost share.

See Appendix A, Public Involvement, at the end of this report for additional information on the extent of public coordination and correspondence during this study.

### VIII. CONCLUSION

This study was accomplished under authority provided by Congressional resolution in 1970. Feasibility studies determined that the primary water resource problem within the Winnepesaukee River Basin is frequent flooding of lake and riverfront property. Through a comparison of structural and nonstructural measures, a comprehensive plan of flood loss reduction was developed. This plan proposes changes in the present regulation of Lake Winnepesaukee together with the construction of channel modifications and floodproofing measures along flood prone areas of the Winnepesaukee River. This plan is the most economical way to reduce the risk and severity of future flood losses within the basin.

The selected plan will provide lakefront and riverfront properties within the Winnepesaukee River Basin with much needed protection from future flood losses. This plan involves changes in the present regulation of Lake Winnepesaukee in conjunction with the implementation of channel modifications and floodproofing measures along flood prone areas of the Winnepesaukee River. The selected plan establishes a set procedure for regulation of Lake Winnepesaukee that provides a high degree of flood protection and is compatible with hydropower generation, recreation, and other water related resources in the basin.

Because the elevation of Lake Winnepesaukee varies throughout the year, it is difficult to assign one level of protection to the proposed project. The best indication of the protection offered by the proposed project would be its effectiveness in reducing expected annual flood losses. It is estimated that the proposed project will reduce annual flood losses within the basin by 70 percent. To supplement this protection, property owners within many of the communities in the Winnepesaukee River Basin would also be able to purchase subsidized flood insurance through the Federal Insurance Administration.

The proposed project will increase the economic strength of communities within the Winnepesaukee River Basin by reducing their risk of future flood losses. Impacts on cultural and environmental resources along the Winnepesaukee River will be minimized by restricting proposed channel work to designated access areas and the center portion of the river. The selected plan is also compatible with existing and proposed recreational facilities within the basin.

Following the severe flooding that occurred during June 1984, State and local interests stressed the need for immediate action. To best expedite implementation of proposed flood loss reduction measures, this project was submitted to the Chief of Engineers for approval under Section 205 of the Continuing Authorities Program.

Many of the once productive hydropower sites along the Winnepesaukee River have been renovated by private developers. This trend is likely to continue due to rising energy costs and State legislation which guarantees an attractive selling price for any electricity generated at small hydro-power facilities.

The water quality of the Winnepesaukee River Basin should improve as communities in the area connect into the Regional Sewer System.

Recreation in the area is likely to continue to grow in response to increased demand and improved water quality.

There appears to be no immediate or short-range water supply needs within the study area.

Feasibility studies have concluded that aside from the flood loss reduction measures being proposed under Section 205, there are no other water resource problems or opportunities which warrant Corps planning or implementation at this time.

## IX. RECOMMENDATIONS

I have reviewed and evaluated in light of the overall public interest the documents pertaining to the alternatives investigated in this feasibility study and the selected plan for flood damage reduction along the Winnepesaukee River, New Hampshire being recommended for implementation through the Special Continuity Authority program. The views and comments of other agencies and the general public have also been reviewed and considered. I have given consideration to the environmental, social, and economic consequences and the engineering feasibility of all the alternatives investigated on both a regional and a national basis.

I recommend that since water resources objectives for the Winnepesaukee River Basin can be addressed through the Continuing Authority Program of Section 205, P.L. 858 as amended, that no specific Congressional authorization is required to implement a Federal project.

11 Sept 85

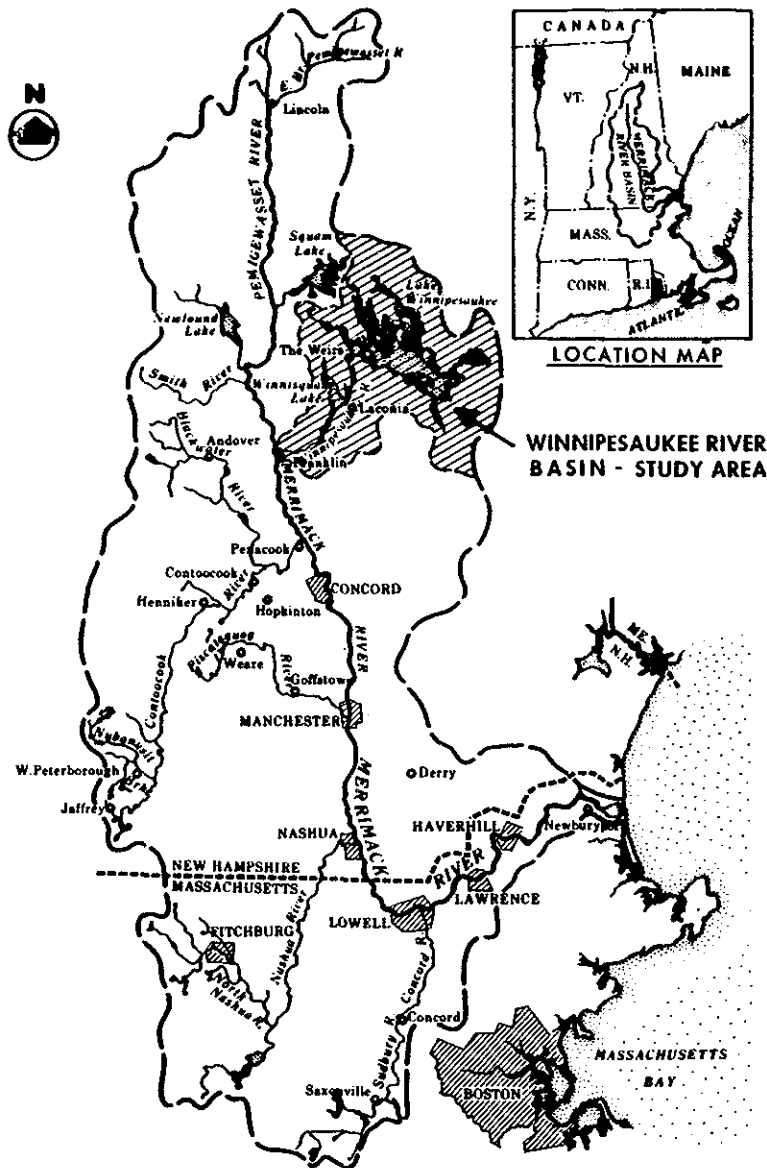
DATE



THOMAS A. RHEN

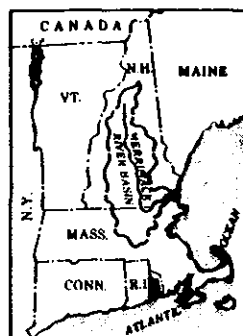
Colonel, Corps of Engineers  
Division Engineer



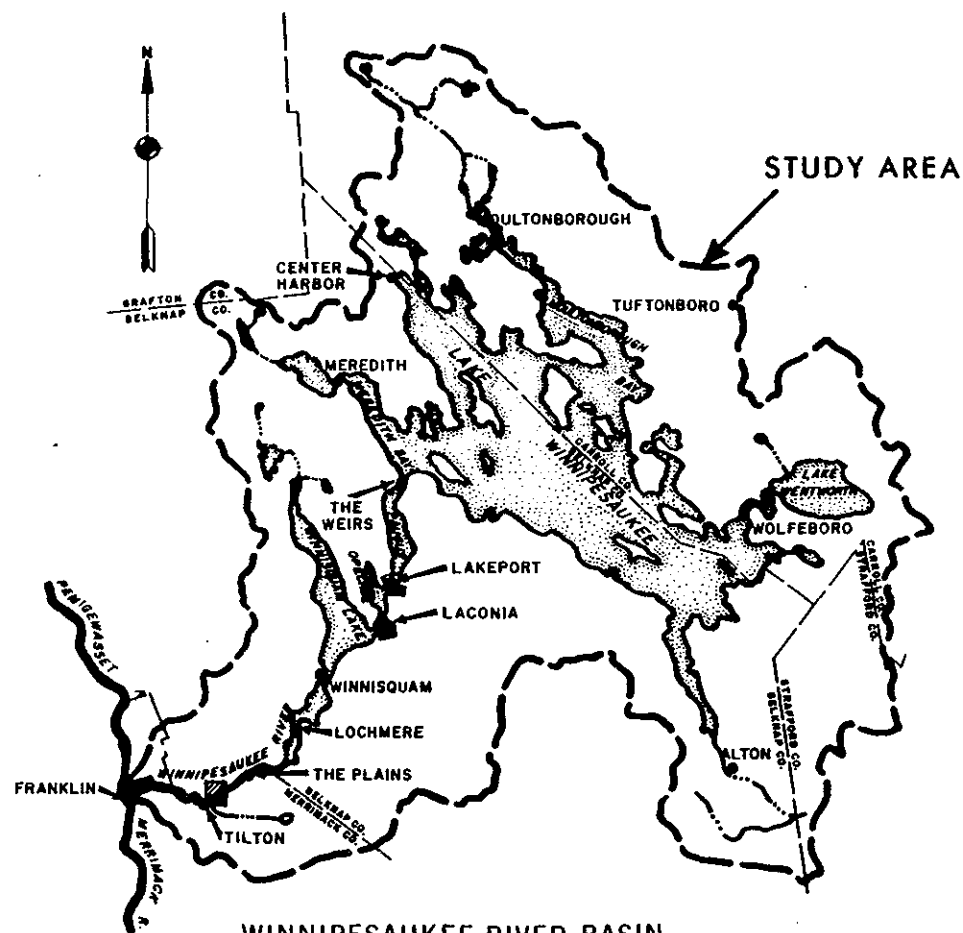


**MERRIMACK RIVER BASIN**

SCALE IN MILES  
4 8 12



**LOCATION MAP**

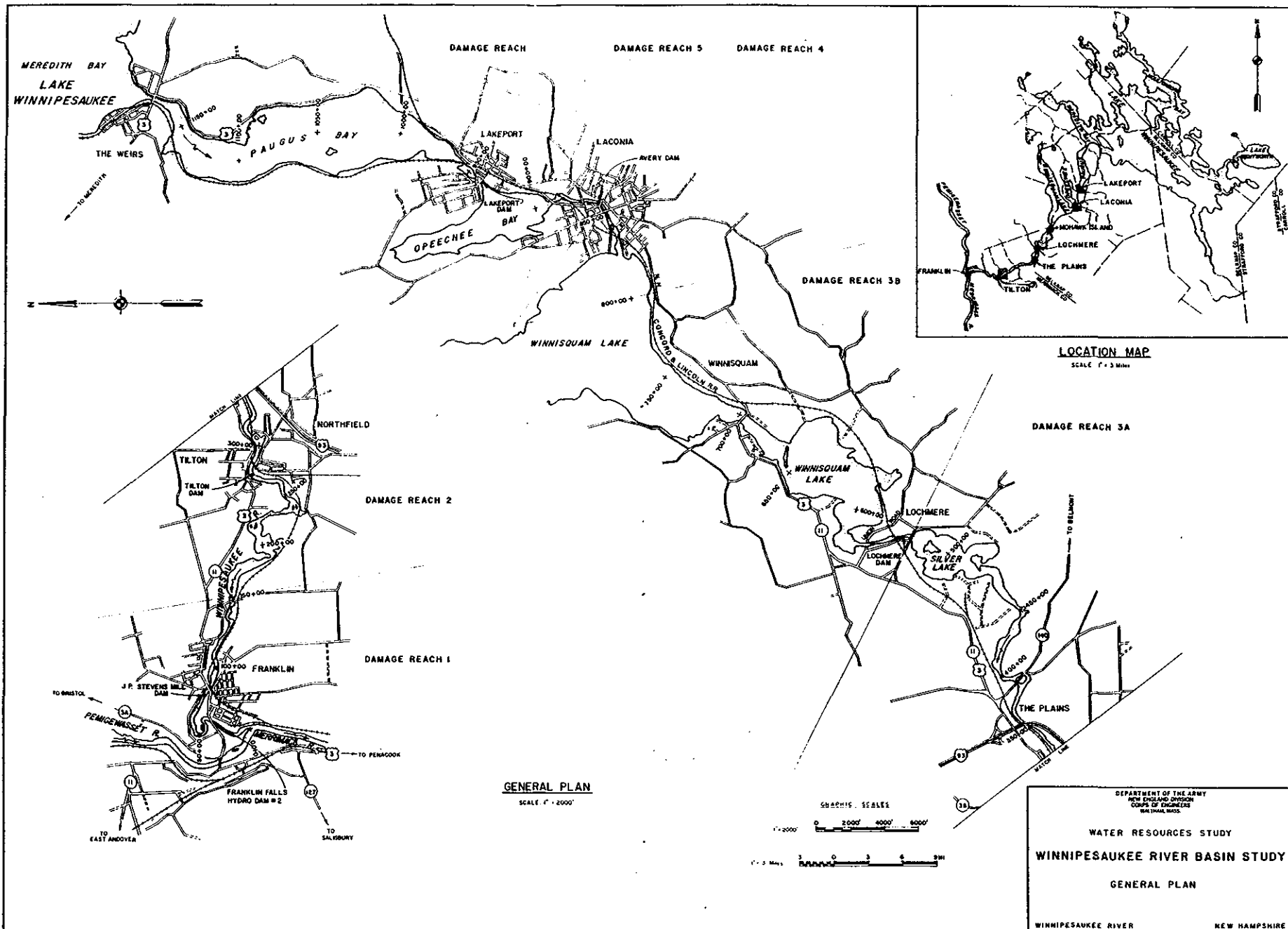


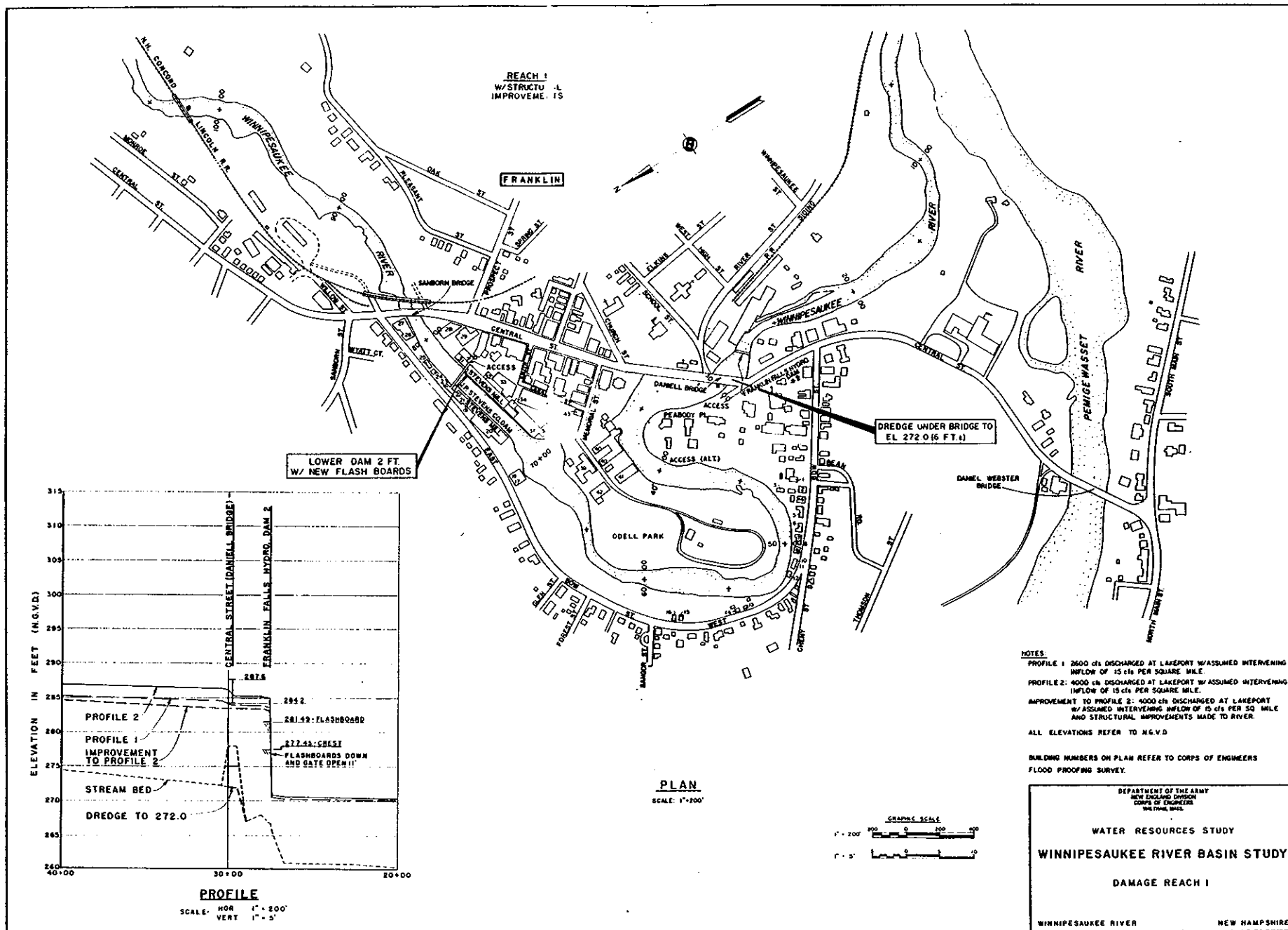
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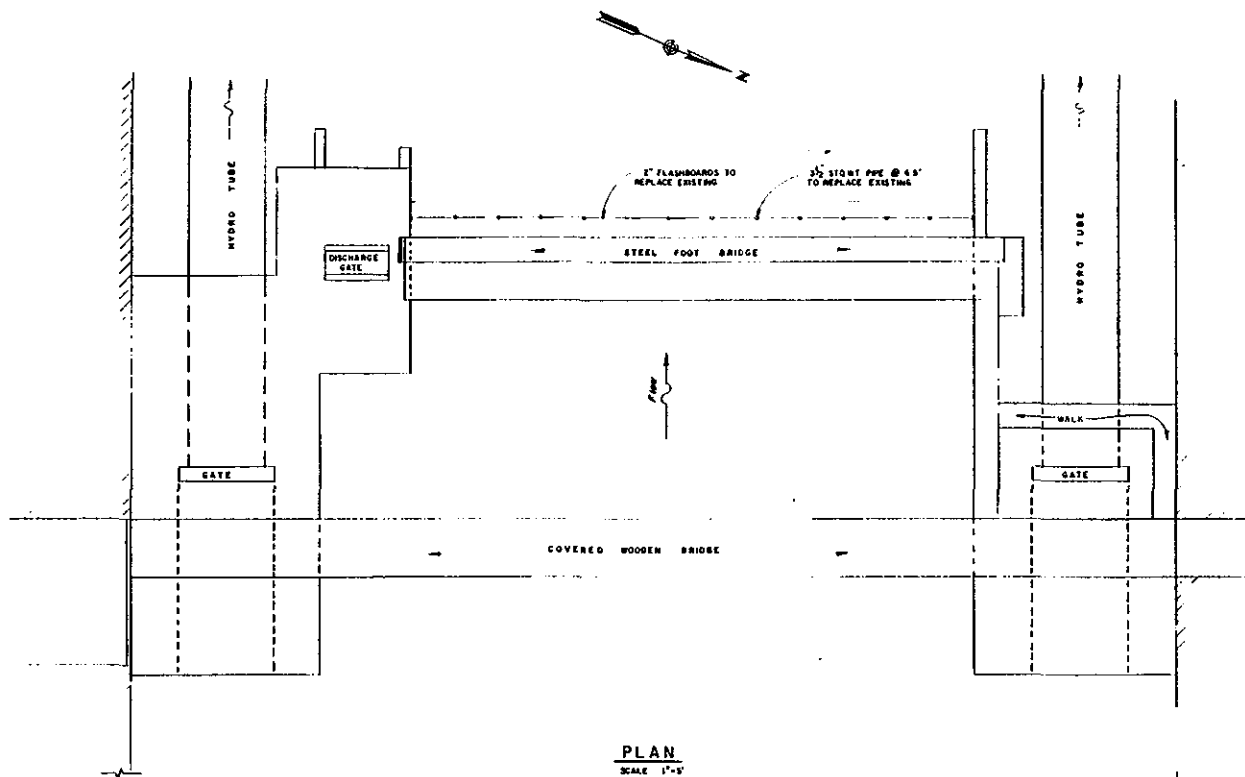
**WATER RESOURCES INVESTIGATION  
WINNIPESAUKEE RIVER, NEW HAMPSHIRE**

DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.

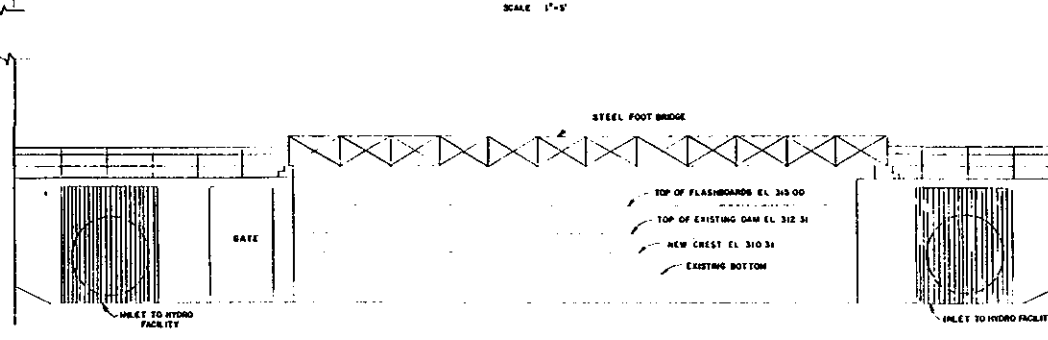
AUGUST 1978







PLAN  
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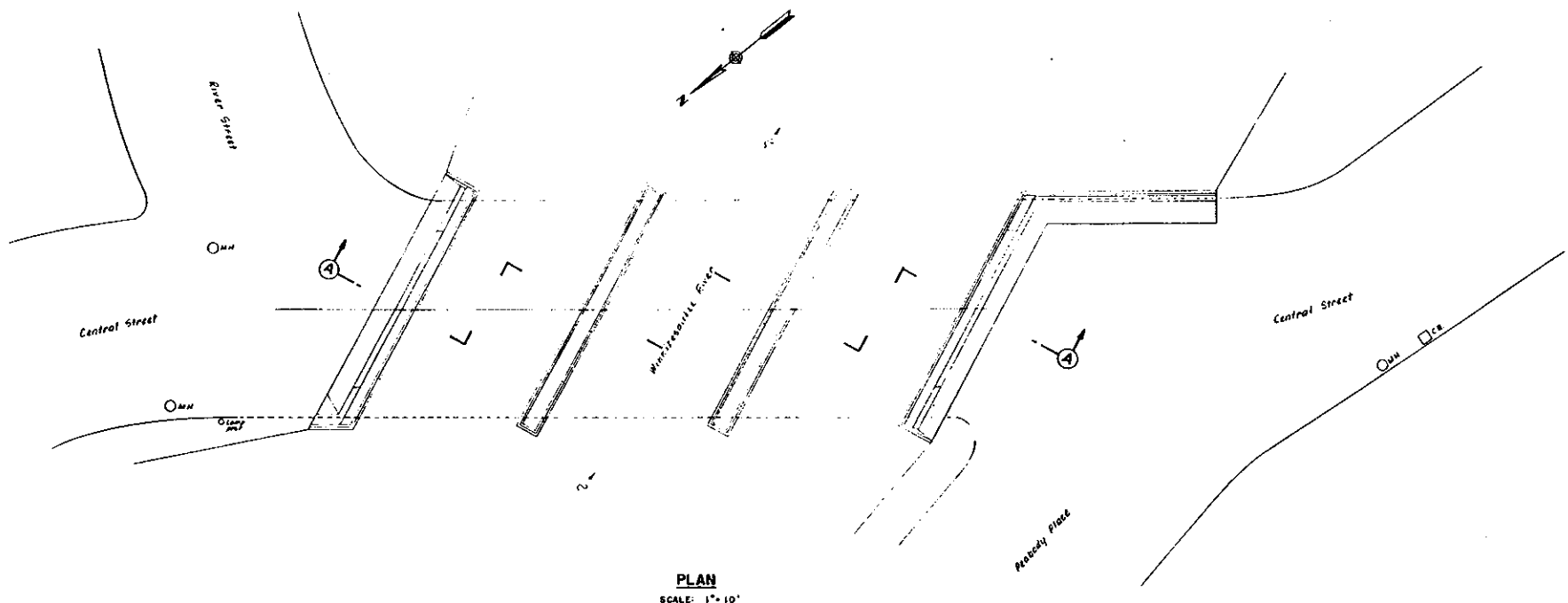


SECTION A-A  
SCALE 1"=5'

DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
100 Davis, Bldg.

WATER RESOURCES STUDY  
WINNIPESAUKEE RIVER BASIN STUDY  
J.P. STEVENS MILL DAM MODIFICATION

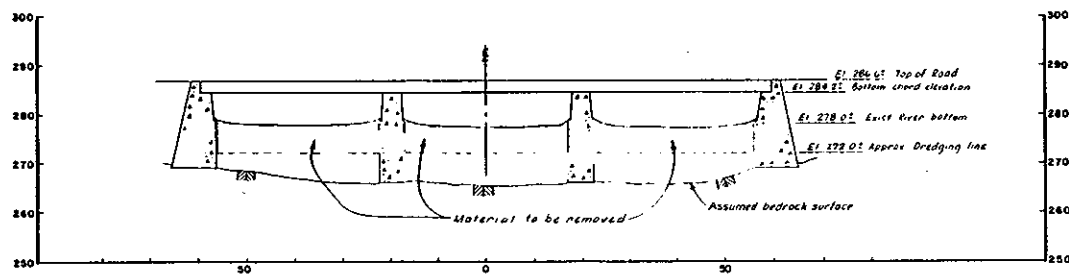
WINNIPESAUKEE RIVER NEW HAMPSHIRE



**PLAN**  
SCALE: 1"=10'

**GENERAL NOTES:**

1. Plan based on drawings dated Aug. 1920 and March 1921 supplied by city of Franklin, N.H.
2. Location of roads, riverbank, subsurface conditions of abutments and river bottom, and all information pertaining to utilities requires verification.
3. Details of the explorations are shown on Plate 2-2.



**SECTION A-A**  
SCALE 1"=10'  
**DANIELL BRIDGE**

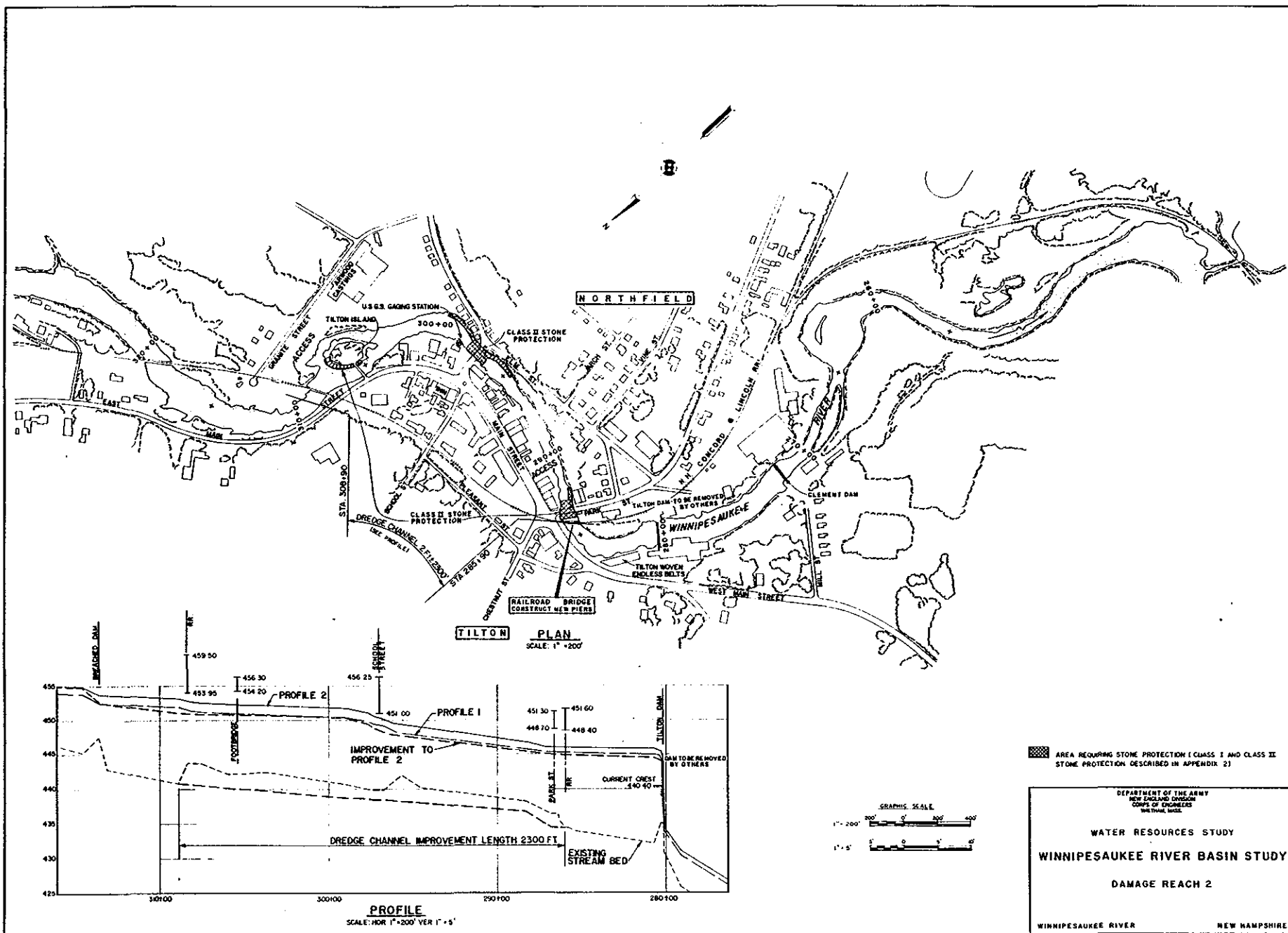
DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
BOSTON, MASS.

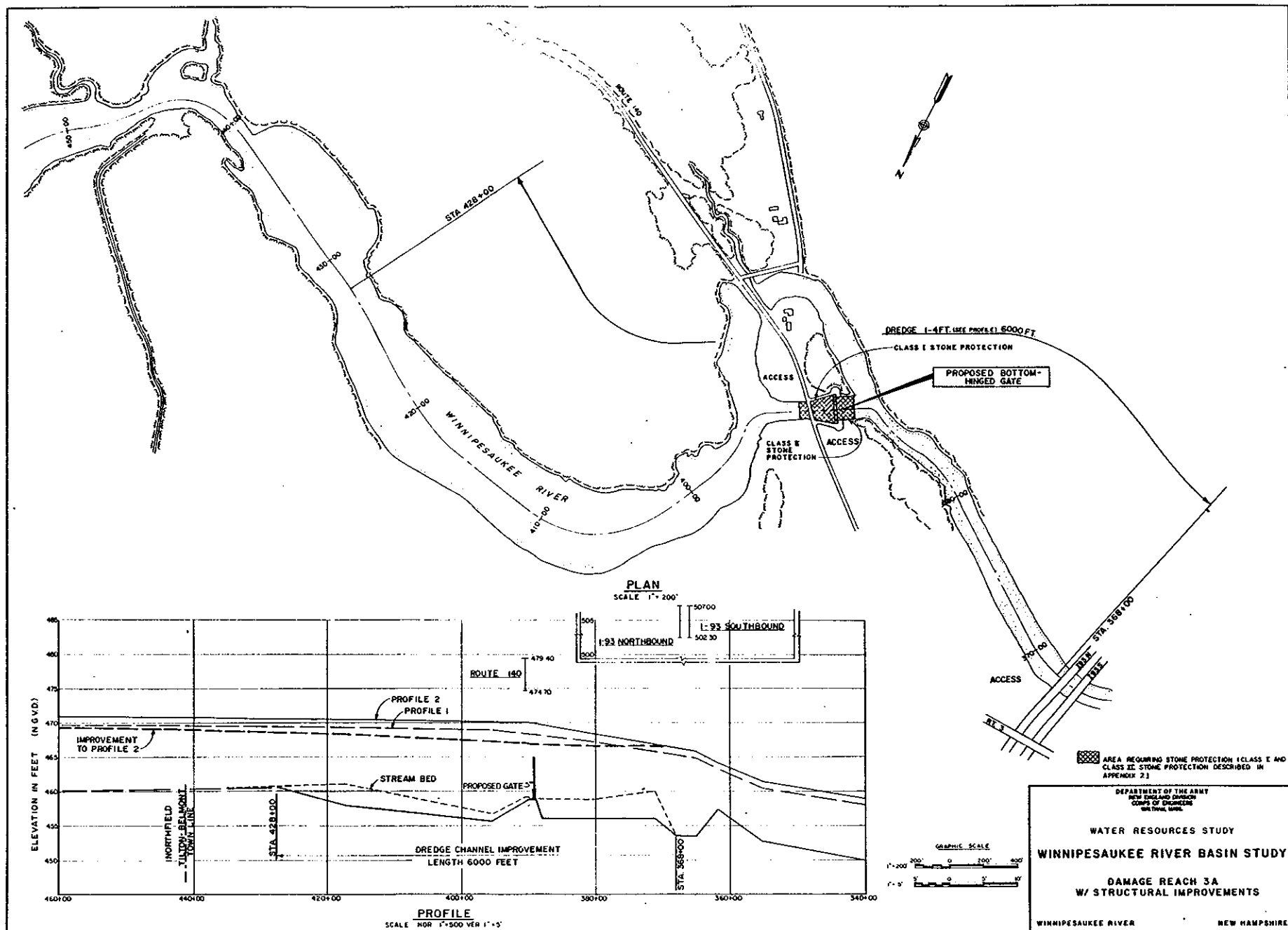
**WATER RESOURCES STUDY  
WINNIPESAUKEE RIVER BASIN STUDY**

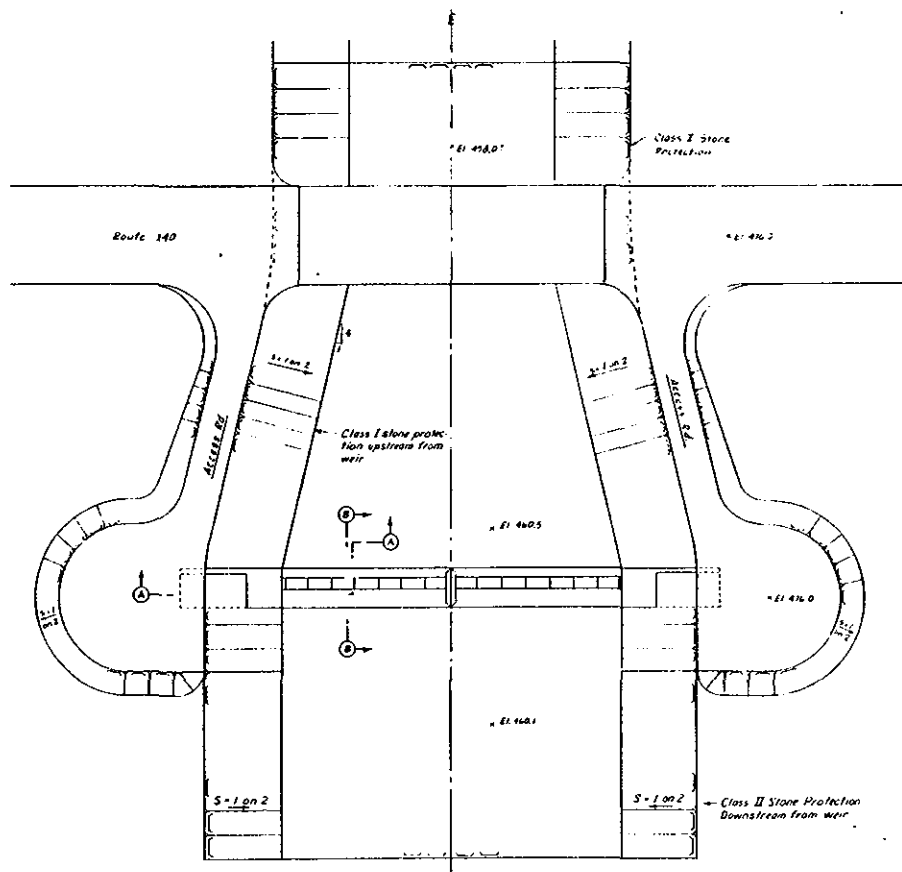
**DANIELL BRIDGE DREDGING**

WINNIPESAUKEE RIVER

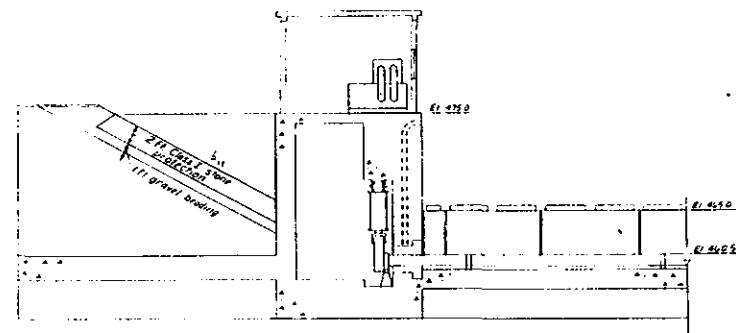
NEW HAMPSHIRE



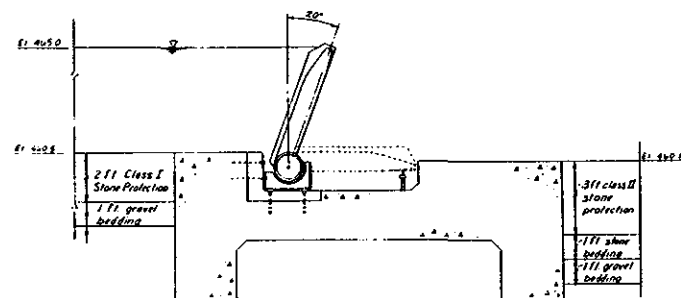




**PLAN**  
SCALE: 1" = 20'



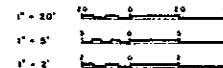
**SECTION A-A**  
SCALE: 1" = 5'



**SECTION B-B**  
SCALE: 1" = 2'

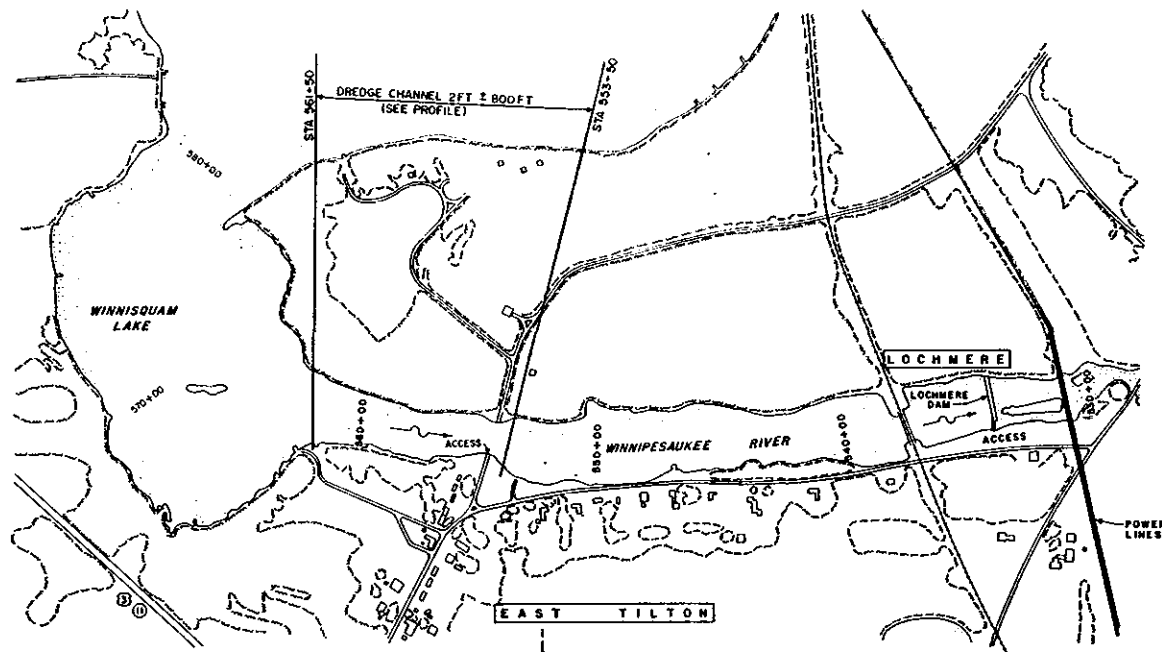
NOTE: CLASS I AND CLASS II STONE PROTECTION DESCRIBED  
IN APPENDIX 2

**GRAPHIC SCALES**

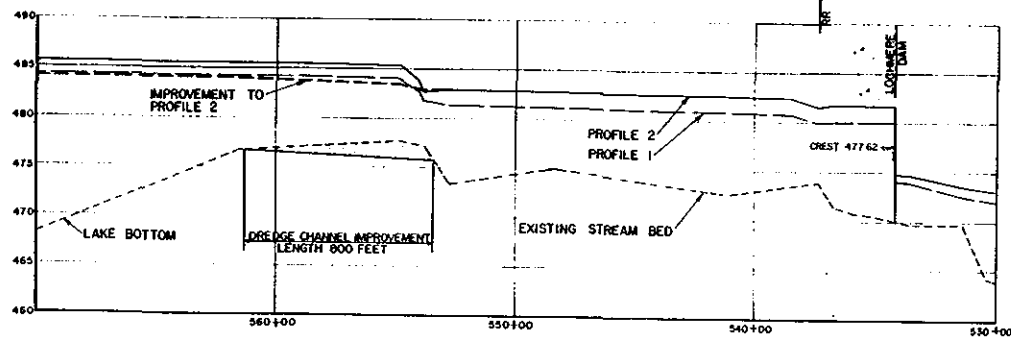


DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
WATER RESOURCES STUDY  
**WINNIPESAUKEE RIVER BASIN STUDY**  
BOTTOM-HINGED GATE  
WINNIPESAUKEE RIVER  
NEW HAMPSHIRE





**PLAN**  
SCALE: 1" = 200'



**PROFILE**  
SCALE: HOR 1" = 200' VER 1" = 5'



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
WALTHAM, MASS.

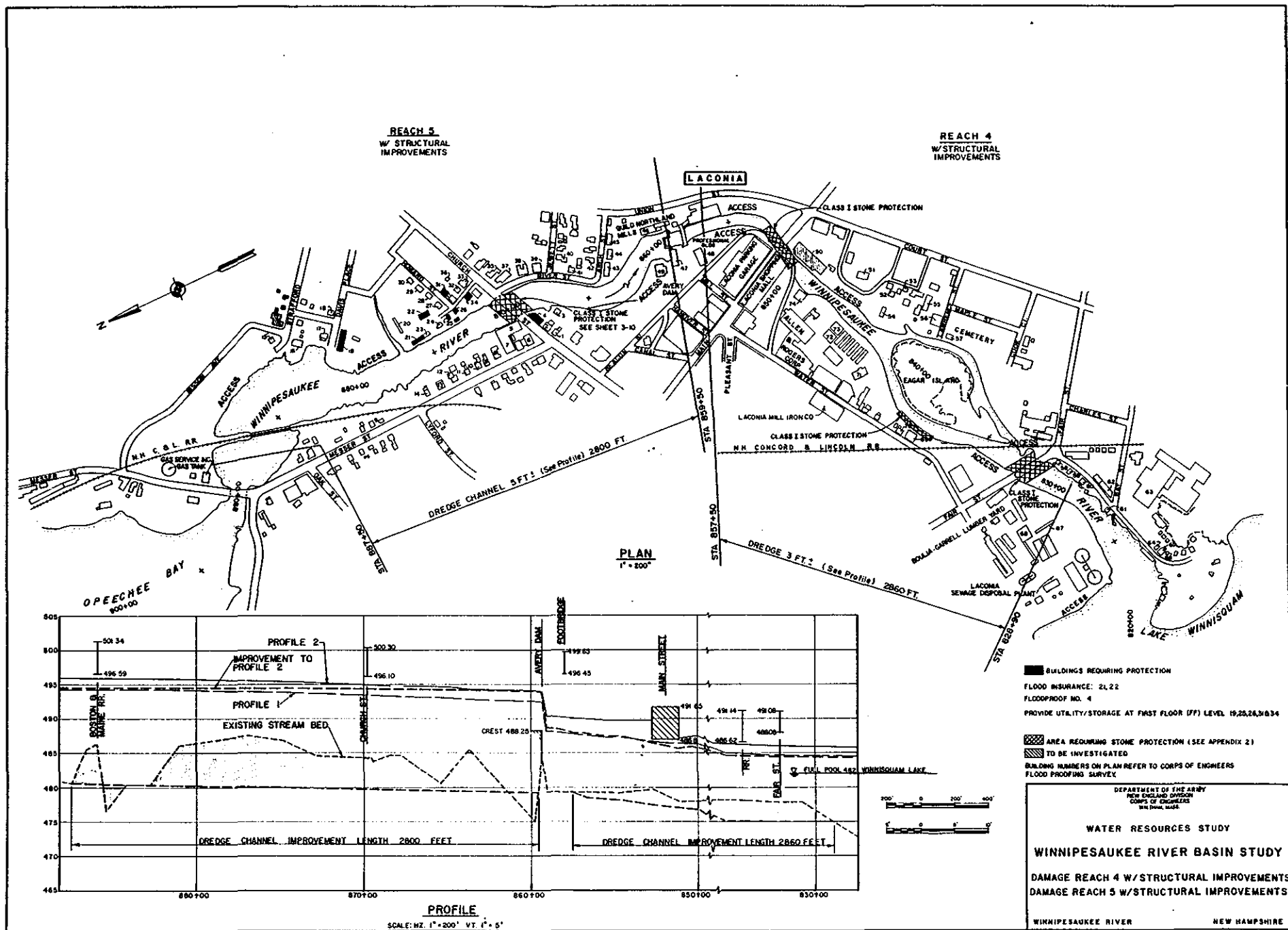
**WATER RESOURCES STUDY**

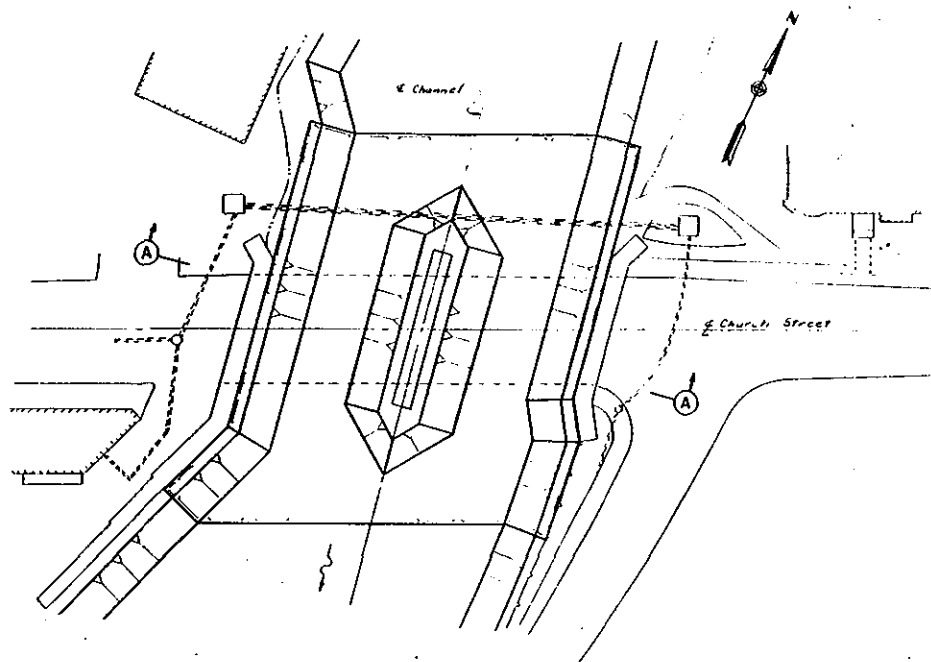
**WINNIPESAUKEE RIVER BASIN STUDY**

**DAMAGE REACH 3B**

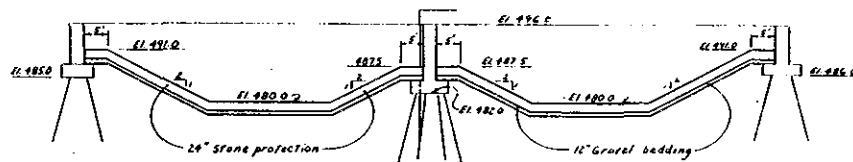
WINNIPESAUKEE RIVER

NEW HAMPSHIRE





**PLAN**  
SCALE 1" = 20'



**SECTION A-A**  
SCALE 1" = 10'

#### GENERAL NOTES

1. Plan based on drawings dated Nov. 1979, supplied by State of New Hampshire Department of Public Works & Highways, Bridge Design Division.
2. Location of roads, riverbanks, sub-surface conditions of abutments and river bottom, and all information pertaining to studies require verification.

DEPARTMENT OF THE ARMY  
WATER RESOURCES DIVISION  
CORPS OF ENGINEERS  
WASHINGTON, D.C.

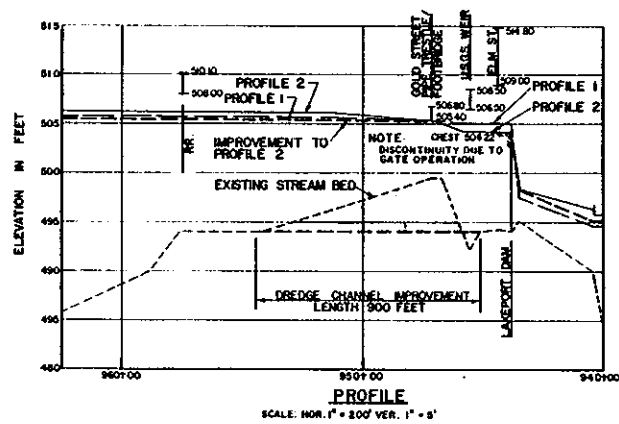
WATER RESOURCES STUDY

WINNIPESAUKEE RIVER BASIN STUDY

CHURCH STREET BRIDGE MODIFICATIONS

WINNIPESAUKEE RIVER

NEW HAMPSHIRE



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
WALTON, MAE

WATER RESOURCES STUDY

WINNIPESAUKEE RIVER BASIN STUDY

DAMAGE REACH 6

WINNIPESAUKEE RIVER NEW HAMPSHIRE

APPENDIX A  
PUBLIC INVOLVEMENT

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<u>Item</u>	<u>Page No</u>
OBJECTIVES	A-1
PUBLIC INVOLVEMENT	A-1

## PERTINENT CORRESPONDENCE

<u>Agency</u>	<u>Date</u>
John H. Sununu Governor of New Hampshire	12 March 1985
Ralph E. Brickett, Commissioner N.H. State Historic Preservation Officer (Corps response dated 3 June 1985)	Enclosure
Kenneth D. Boehner, City Manager City of Laconia, New Hampshire	7 March 1985
Board of Selectmen Gilford, New Hampshire	1 March 1985
Raymond S. Burton, Executive Councilor State of New Hampshire	26 February 1985
N.H. Fish and Game Department (Corps response dated 25 April 1985)	25 February 1985
Gloria Sawicki Lochmere, New Hampshire	15 February 1985
Joe Gelbard The Sant Bani Press, Tilton, N.H.	14 February 1985
U.S. Fish and Wildlife Service (Corps response dated 25 April 1985)	14 February 1985
Leslie N. Corey, Jr., Executive Director Audubon Society of New Hampshire (Corps response dated 25 April 1985)	13 February 1985
Tilton Conservation Commission Tilton, New Hampshire	13 February 1985

F. E. Brackley, Coordinator/Botanist N.H. Natural Heritage Program (Corps response dated 1 May 1985)	13 February 1985
Ralph Kirshner, President Lake Winnepesaukee Association (Corps response dated 25 April 1985)	13 February 1985
Jeff Fair, Director The Loon Preservation Committee (Corps response dated 25 April 1985)	13 February 1985
N.H. Fish and Game Department	11 February 1985
Nathan Tufts, Jr., President Merrimack River Watershed Council (Corps response dated 21 May 1985)	8 February 1985
Marjory M. Swoop, Executive Director N.H. Association of Conservation Commissions	7 February 1985
Ann P. Cailler Tilton, New Hampshire	1 February 1985
U.S. Environmental Protection Agency	31 January 1985
Barbara B. Bowler, State Representative Belknap District 2	29 January 1985
David R. Caron, Administrator Belmont, New Hampshire (Corps response dated 14 May 1985)	21 January 1985
Arwood Corporation Tilton, New Hampshire	21 January 1985
Peter W. Spear Concord, New Hampshire (Corps response dated 21 May 1985)	7 January 1985
Marguerite Samson Laconia, New Hampshire (Corps response dated 25 January 1985)	2 January 1985
Frank R. DeNormandie, Public Works Director Laconia, New Hampshire (Corps response dated 25 January 1985)	31 December 1984

Robert H. Rowe, Attorney at Law Amherst, New Hampshire	3 December 1984
(Corps response dated 28 January 1984)	
Delbert F. Downing, Chairman N.H. Water Resources Board	13 November 1984
Richard H. Strome, Director N.H. Civil Defense Agency	7 November 1984
Jeff Fair, Director The Loon Preservation Committee	24 October 1984
Ralph Kirshner The Loon Preservation Committee	3 October 1984
Board of Selectmen Sanbornton, New Hampshire	26 September 1984
Peter W. Spear Concord, New Hampshire	19 September 1984
Albert A. Sprague Lochmere, New Hampshire	17 September 1984
Bryant & Lawrence Inc. Tilton, New Hampshire	13 September 1984
Timothy & Valerie Baulotte Lochmere, New Hampshire	12 September 1984
Tilton Conservation Commission Tilton, New Hampshire	10 September 1984
William W. Joscelyn Tilton, New Hampshire	5 September 1984
Andrew J. D'Angelo Winnisquam, New Hampshire	26 August 1984



Marjory M. Swope, Executive Director N.H. Association of Conservation Commissions	24 August 1984
Donald P. Foudriat Laconia, New Hampshire	24 August 1984
Richard J. Tichko Penacook, New Hampshire	23 August 1984
Peter W. Spear Concord, New Hampshire	12 August 1984
U. S. Fish & Wildlife Service	20 April 1983
U. S. Fish & Wildlife Service	27 January 1983
U. S. Fish & Wildlife Service	9 June 1981
N. H. Fish & Game Department	26 May 1981
U. S. Fish & Wildlife Service	12 September 1980
U. S. Fish & Wildlife Service	6 February 1973

## OBJECTIVE

In the broadest sense, the "public" consists of non-Corps of Engineers entities, Federal, State, local and regional agencies as well as public and private organizations, and individual citizens. The public participation program is intended to provide a continuous two-way communication process which will maximize the opportunity for the public to (1) be involved in the overall planning process; (2) be aware of the study progress; and (3) make decisions that would have impacts on the lives of those in the study area. Inasmuch as major decisions made throughout the study will be based upon expressed needs of local, county, State and regional officials as well as the general public, it is necessary to establish a mechanism to channel information to interested participants and to funnel their responses to those conducting the study.

## PUBLIC INVOLVEMENT

Following the severe flooding that occurred during the spring of 1953 and 1954, the NHWRB requested the Corps to investigate flooding conditions and develop a plan to reduce the risk of future flood losses. Our initial study was completed in 1957 and concluded that Federal participation in the construction of channel modifications along the Winnepesaukee River was not economically justified.

Since then, continued growth within the watershed has increased the potential of flood damages. Realizing this, State and local interests requested the Corps to update their initial study in 1970. Corps personnel met with State officials to coordinate study efforts and outline an initial public involvement program. As part of this program, a public meeting was held on 29 August 1972 in Laconia, New Hampshire to identify the problems and needs of the study area. During the meeting, local officials and residents of the area expressed concerns over the water quality of the basin flooding conditions, lake level regulation, recreation, and study procedures. Following the meeting, a Plan of Survey report was prepared, dated July 1973, which identified public concerns and outlined study procedures.

The lack of funding curtailed further study activities until 1978. Because of the time lapse and new planning guidelines and procedures, the Corps held a second public meeting in Laconia, New Hampshire on 15 November 1979. Prior to the meeting, a Public Information Bulletin and Brochure were distributed to explain the study, announce the meeting and encourage participation. Public concerns expressed at the second meeting were similar to those expressed earlier. The potential for hydropower development was emphasized, reflecting the increase in energy costs. A Reconnaissance Report was released in January 1981 to document study findings and present a strategy for further investigations.

During June of 1981, the Corps contracted the services of the Lakes Region Planning Commission (LRPC) to assist in developing a comprehensive

public involvement program for the Winnepesaukee River Basin Study. They also made corrections and additions to the existing Corps mailing list and provided periodic news articles in the LRPC Report updating local residents on the progress of the Corps' study. The LRPC Report is mailed out to over 2,000 residents of the Lakes Region.

In July 1981, a study committee made up of representatives of basin communities, Federal and State interests and local citizens (see following list of participants) was formed by the NHWRB in coordination with the LRPC. The purpose of the committee was to work with members of the Corps and NHWRB to help formulate the most cost effective plan that would both reduce the risk of future flood losses within the basin and be acceptable to the public. Meetings were held periodically throughout the study.

#### Winnepesaukee Study Committee Members

Mr. B. Kimball Ayers, Jr.  
Lake Winnepesaukee Association

Mr. Fred Benson  
U. S. Fish & Wildlife Service

Mr. David Caron  
Belmont Town Manager

Mr. John Chandler  
Local Citizen

Mr. Frank DeNormandie  
Laconia Public Works Director

Mr. Donald Foudriat  
Laconia Planning Board

Mrs. Justine Gengray  
Tilton Conservation Commission

Mr. Bill Ingham  
N. H. Fish & Game Dept.

Mr. Jim Rollinn  
Executive Director, LRPC

Mr. James VanFleet  
Northfield Conservation Commission

#### Dates of Study Committee Meetings

3 February 1982  
14 April 1982  
23 March 1983  
18 July 1984

Coordination has been maintained throughout the study with the U. S. Fish & Wildlife Service and N. H. Fish & Game Department. A field trip was made with representatives of these agencies on 22 April 1981 to identify potential impacts to fish and wildlife habitat. As detailed plans were developed, meetings were held on 21 March 1984 and 11 April 1984 to discuss the specific impacts proposed channel work and changes to present lake regulation procedures would have on environmental resources of the area. This coordination has resulted in several letters from these agencies (see Pertinent Correspondence) recommending various measures of good project design that would help reduce the adverse impacts of the selected plan. Many of these measures have been incorporated into the project. Final coordination letters were received from these agencies during the 60-day public review period.

A third public meeting was held in Laconia, New Hampshire on 22 August 1984 to present the proposed project to the public and receive their comments. Prior to the meeting, a News Release and Public Information Brochure were distributed to describe the project and announce the upcoming meeting. During the public meeting, State and local officials and residents of the basin questioned the high cost of the project, cost sharing arrangements, and the benefit to cost analysis; and expressed concerns over the environmental impacts of the project. Several letters were received after the public meeting expressing these same concerns (see Pertinent Correspondence).

Following the August meeting, the NHWRB held a meeting with State and local officials on 19 September 1984 in Tilton, New Hampshire. The purpose of the meeting was to discuss in detail the cost-sharing, economic, and environmental concerns that were raised at the public meeting. After detailed discussion, many of those who voiced concerns at the public meeting seemed satisfied that the project was sound.

A similar meeting was held on 27 September 1984 in Concord, New Hampshire with officials from State agencies; most of which expressed strong support for the project.

During December 1984, over 200 draft copies of this report were distributed to other Federal, State, and local agencies for public review. This gave all interested parties the opportunity to comment on the findings of our study. During the public review period we received several letters of support along with several others that raised questions and concerns about the findings of our study. These letters, along with our responses, are contained in Appendix A.

A fourth public meeting was held on 21 January 1985 by the NHWRB to address concerns raised during the public review period. New England Division staff members were invited to assist the NHWRB. About 50 people attended this meeting. Four individuals and a representative of the New Hampshire Fish and Game Department spoke out in opposition to channel modifications because of adverse environmental impacts. All others who spoke, including several hydropower developers, expressed support for the proposed project.

Feasibility studies determined that the proposed project could best be implemented under Section 205 of the Continuing Authorities Program. During June 1985, the Winnepesaukee River Basin Detailed Project Report was submitted to the Chief of Engineers. The report recommends that the selected plan of flood loss reduction measures be authorized for construction under the Section 205 program. Public coordination will be maintained during all future studies conducted under this program.

Since further Congressional authority is not required under Section 205, this feasibility report has been submitted to the Board of Engineers for Rivers and Harbors recommending that studies under the 1970 Congressional resolution be concluded. Copies of this feasibility report have been provided to Congressional, State and local interests.

**PERTINENT CORRESPONDENCE**



STATE OF NEW HAMPSHIRE  
OFFICE OF THE GOVERNOR

STATE HOUSE · CONCORD, NEW HAMPSHIRE 03301

JOHN H. SUNUNU  
GOVERNOR

March 12, 1985

Colonel Carl B. Sciple  
Division Engineer  
U.S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254-9159

Dear Colonel Sciple:

The State of New Hampshire conditionally supports the proposed local flood protection project for communities within the Winnepesaukee River Basin, as outlined in the draft Detailed Project Report, and is considering the request you provided on the required items of local cooperation. The non-Federal share of project cost is currently estimated at \$1.3 million. It appears that the proposed project will significantly reduce the risk and severity of future flood losses on Lake Winnepesaukee and along the Winnepesaukee River.

We understand that a formal agreement of local assurances will be required after the Winnepesaukee Detailed Project Report is approved by the Chief of Engineers and the preparation of plans and specifications are substantially complete. At that time, a more reliable estimate of project costs and cost sharing arrangement will be prepared. Provided the non-Federal Cost of the proposed project remains in the neighborhood of \$1.3 million, the State of New Hampshire will consider a formal agreement at that time.

The intent to participate in this project is conditioned upon the CORP's satisfactorily addressing the concerns presented by state agencies. Particular attention should be focused on the following:

- A clear presentation on non-structural alternatives and how the CORP's evaluated such options;
- Historic preservation and archeological concerns as summarized in the Historic Preservation Office's letter received March 6, 1985;
- A review of the estimated cost of moving utility structures within the Winnepesaukee River Basin regional sewer disposal system; and
- Careful consideration of the concerns raised by the Fish and Game Department.

Thank you for the opportunity to review this important proposal.

Sincerely,

John H. Sununu  
Governor

JHS:ds/jyb



NEW HAMPSHIRE DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT

RALPH BRICKETT  
COMMISSIONER

TELEPHONE: 603-271-2411

Rec'd march 6  
DLS  
↑  
May 6, 1985

David G. Scott, Acting Director  
Office of State Planning  
2½ Beacon Street  
Concord, New Hampshire 03301

RE: Local Flood Protection / Winnepesaukee River Basin, New Hampshire  
U.S. Army Corps of Engineers - NED

Dear Mr. Scott:

As required by the National Historic Preservation Act and federal Advisory Council on Historic Preservation "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800), the New Hampshire State Historic Preservation Office has reviewed the above referenced project for potential effects on properties listed, or eligible for listing, in the National Register of Historic Places.

The comments which follow are based upon the Detailed Project Report/Environmental Assessment, dated November 1984, and other data currently available to the Historic Preservation Office.

1. Reach 1, alterations will be made to the Stevens Mill Dam. This structure is a contributing element in the Franklin Falls Historic District (listed 8/19/82 in the National Register of Historic Places).

Lowering the crest elevation of the dam by two feet constitutes an "Adverse effect" under 36 CFR 800.3(b)(1), "Destruction or alteration of all or part of a property." Consultation with the Advisory Council on Historic Preservation and execution on a Memorandum of Agreement will be necessary, pursuant to 36 CFR 800.8(b).

The draft report lacks sufficient data to justify this action. Flood waters in Franklin reached an historic high during the 1984 flood event, and damage which occurred was attributed to the backup of flood waters behind the Stevens Mill Dam caused by a buildup of debris. Since that event, an eight-bay section of the historic Stevens Mill has been removed, and this will allow cranes to operate behind the dam to prevent, or eliminate, similar buildups in the future. Also, the penstock for the recently-completed Stevens Mill Dam Hydroelectric Project (F.E.R.C. #3760) will pass an additional 800-1000 cfs at this location during future flood events. Therefore, it appears that alteration of the dam is unnecessary.

2. In Reach 2, dredging and stonework will occur in an archeologically-sensitive area around Bridge Street, including a part of the Tilton Downtown Historic District (listed 7/7/83 in the National Register of Historic Places). This location marks an important river crossing in the initial settlement and development of the Sanbornton grant, from the first Sanbornton Bridge (situated a little upstream from the present bridge) throughout the 19th century. The first perma-





nent mills in Sanbornton were established "a few hundred yards downstream from the bridge in 1765." The bridge and mills provided the nucleus for growth of the hamlet of Sanbornton Bridge during the 18th and early 19th centuries, which included the establishment of other small mills along the river.

Dredging for a distance of 400 feet downstream from the present bridge, and stonework downstream of the bridge on the Tilton side of the river, will occur within the National Register district. The district boundary follows the center line of the river for that distance, which is also the town line, to include a complex of 19th century mills, two of which project into the river. Although dredging will not affect those characteristics which qualify these mills as part of the district, there is a distinct possibility of adversely affecting archeological resources which may be present, relating to the earliest industrial growth of the district. The river profile in Plate 6 shows a marked obstruction opposite School Street, the possible "footprint" of a submerged dam of an earlier era.

In summary, dredging and stonework around Bridge Street is within the area documented for the earliest bridge crossings and industrial development within the Sanbornton grant, and the development of the hamlet of Sanbornton Bridge. Indirect evidence suggests that remains may exist, both in the river and on shore, of this early period in the growth of the hamlet. An archeological survey will be necessary to determine the presence or absence of such remains, and the potential significance of any that might be identified.

3. Other early industrial areas occur in Reaches 4 and 5 in Laconia, and Reach 6 in Lakeport. The river profile in Plate 10 shows a marked obstruction above the Avery Dam adjacent to a 19th century mill development, perhaps representing an earlier dam or weir. Documentary and underwater field studies should be undertaken to identify any historical resources which may be present in these areas.
4. In Reach 3, there is considerable potential to adversely affect prehistoric and historic archeological sites. While the Lochmere Archeological District (listed 11/1/82 in the National Register of Historic Places) and other sites have been identified by the Lakes Region Archeological Survey of the University of New Hampshire, it should be noted that survey work along the Winnepesaukee River was done by a sampling strategy, and that no underwater archeology has been done within the river channel.

Specifically for Reach 3A, it will be necessary for studies to investigate reports of fish weirs (prehistoric and/or historic) in the river channel south of Route 140. And in the area of the proposed hinged dam and stonework, studies will be necessary to confirm limits of previous disturbance and the location of any archeological sites with integrity.

In Reach 3B, there will be direct and adverse impacts to the Lochmere Archeological District. In general, the mitigation measures proposed for the channel modifications between Union/Church Streets and Lake Winnisquam are appropriate. An archeological survey will be necessary to confirm the report of a submerged structure (weir or dam) in this section, to sample the stratified contents of the channel, and to prepare, if required, data recovery measures appropriate to any identified resources.

There is a problem with access at this location. On either shore north of Church Street to the lake, there is a prehistoric site; being relatively shallow, even the use of matting and rubber-tired vehicles could impact these sites. Access at Church Street is difficult for two reasons. If direct and perpendicular to the channel, a fairly steep grade will need to be descended. And, to either side of the roadway, at river's edge, are historic archeological sites which cannot be protected by the use of matting and rubber-tired vehicles.

Mitigation measures for channel modifications and access to the river in Reach 3B will require consultation with the Advisory Council on Historic Preservation. These measures and procedures for further consultation should be ratified as part of a Memorandum of Agreement covering the project as a whole, not apart from any agreement for any other resource impacted by the project (e.g., Stevens Mill Dam).

It is noted that channel modifications below Church Street to the Lochmere Dam are being contemplated (EA-25). The Historic Preservation Office objects to any modifications in that stretch of the river. First, there is no justification offered for the dredging. Channel improvements have been made already by removal of Union Bridge and its abutments, and further improvements will be made within the Lochmere Archeological District above the bridge site. Work below the bridge site will breach two historic dams and severely damage at least one mill site, all of which are essential resources needed to retain the integrity of the historical character of the district. Erosion of these resources would continue, and eventually the two dams would be completely destroyed.

5. It is recommended that all proposed access areas and locations of stonework, not just those in Reaches 2 and 3, be investigated for possible archeological resources. Although many of these areas are described in the report as being disturbed, it should be noted that significant components of stratified archeological sites have been located below the limits of previous disturbance; and, if these components are profiled at river's edge, then even the use of matting and rubber-tired vehicles may not avoid damage to archeological sites.
6. Finally, it has been noted that five or more other properties may be impacted by the project. These are:
  1. State owned railroad bridge at Park Street, in Tilton;
  2. USGS weir, in Lakeport;
  3. Gold Street Trestle Bridge, in Lakeport;
  4. A stone-crib in Paugus Bay near the Elm Street Bridge, in Lakeport; and,
  5. A building (pg. 35), or buildings (Plate 10), to be flood-proofed/protected, in Laconia.

The Historic Preservation Office lacks documentation for any of these properties, some or all of which could have historical interest or significance. Therefore, the Corps staff should prepare appropriate documentation and statement of significance for these properties for review by the Preservation Office. If any of these properties are significant and will be adversely affected by the project, then consultation will be required with the Advisory Council on Historic Preservation; mitigation options agreed upon will be made a part of any Memorandum of Agreement for the project.

In summary, the findings of the New Hampshire State Historic Preservation Office are as follows:

1. The Office does not object in principle to the project, but it does object to channel modification work in the Lochmere Archeological District downstream of Church Street;
2. Excepting the stream segment below Church Street in Lochmere, known or potential adverse effects to significant or potentially-significant properties can be mitigated;
3. Consistent with testimony at the September 27, 1984 hearing, the Office has identified adverse effects to two National Register properties -- the Stevens Mill Dam and the Lochmere Archeological District, but the report lacks sufficient data to justify either alteration of the dam or channel modification work in the District below Church Street;
4. The Office concurs with the Corps' opinion that impacts could occur to archeological sites south of Route 140 and in the Lochmere Archeological District, and in the need for an archeological survey of areas to be dredged or riprapped, to more precisely locate any resources present and to determine their significance (see EA-25);
5. The Office is of the opinion that the archeological survey should be extended to include (a) portions of Tilton, Laconia, and Lakeport where the possibility exists for early industrial sites, and (b) access areas for equipment; and,
6. The Office has identified potential effects on five or more other properties that could have historical significance, and has requested consultation with the Corps regarding these properties.

Please forward this letter to the U. S. Army Corps of Engineers-NED, pursuant to federal regulations governing historic preservation review, to aid the Corps in continued planning of this project. The Corps is responsible for resolving all questions and concerns with the Historic Preservation Office and federal Advisory Council on Historic Preservation, and this should be done before preparation of the final report and environmental assessment.

Sincerely,



Ralph E. Brickett, Commissioner  
Department of Resources and Economic Development  
NH State Historic Preservation Officer

REB:GWH:g

cc: Walter Stickney, Office of the Governor  
Delbert Downing, Water Resources Board  
Sharon Conway, Advisory Council on Historic Preservation



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

June 3, 1985

REPLY TO  
ATTENTION OF  
Planning Division  
Plan Formulation Branch

Honorable John H. Sununu  
Governor of the State of New Hampshire  
Concord, New Hampshire 03301

Dear Governor Sununu:

I am writing in response to your letter of March 12, 1985 in which you express support for the proposed flood protection project within the Winnepesaukee River Basin. Your support, however, is conditional upon our satisfactorily addressing concerns raised by State agencies regarding nonstructural alternatives, archaeological sites, utility crossings and environmental resources. We have addressed your concerns by responding directly to the State agencies. I have summarized our responses in this letter. I have also included the pertinent correspondence and coordination in our final report which I will be submitting to the Chief of Engineers in June 1985.

Under existing conditions the New Hampshire Water Resources Board (NHWRB) can only release discharges of up to about 2,000 cubic feet per second (cfs) from Lakeport Dam before causing downstream flooding. This greatly restricts their ability to regulate the level of Lake Winnepesaukee. The NHWRB has indicated that increased discharge capability from Lakeport Dam would greatly improve their ability to regulate Lake Winnepesaukee and reduce flood losses within the basin.

To address this problem, we have proposed a plan of channel modifications designed to increase the carrying capacity of the Winnepesaukee River and provide the NHWRB with the ability to release up to 4,000 cfs from Lakeport Dam without worsening downstream flooding conditions. If nonstructural measures were implemented in lieu of channel modifications, increased discharges from Lakeport Dam would worsen downstream flooding. Other than total acquisition of flood prone property, which would be far more costly and disruptive than channel modifications, nonstructural measures would not prevent all of the additional flood losses that would result from increased discharges. Floodwaters would overflow their banks inundating septic systems and surrounding floodproofed structures. Utilities would have to be temporarily shut off and the residents evacuated until floodwaters recede. We feel the NHWRB would have difficulty implementing a plan that provides the residents of Lake Winnepesaukee with added flood protection at the expense of downstream residents.

Other nonstructural alternatives, such as changing the present regulation of Lake Winnepesaukee, have been examined in detail. In fact, 85 percent of the total benefits that are estimated to result from implementation of the recommended plan, are attributed to nonstructural changes in the present regulation of Lake Winnepesaukee.

We attempted to establish two-way communication with the New Hampshire State Historic Preservation Officer (SHPO), so that archaeological concerns could be adequately addressed during the early stages of our investigation. However, despite our written and verbal requests (letters of June 1, 1984 and August 24, 1984; meeting of September 27, 1984; and many telephone calls), we did not receive any statement of potential concerns from the SHPO until 3 weeks after the close of our public comment period, which ended March 1, 1985. Fortunately, we were aware of many of the concerns raised by the SHPO; such as the Stevens Mill Dam, Lochmere Archaeological District, and Route 140 Bridge area; through coordination with Dr. Humes of the SHPO staff and Ms. Justine Gengras of the Tilton Conservation Commission. Archaeological concerns in these areas are addressed in the draft Winnepesaukee Detailed Project Report.

Archaeological concerns in the Lochmere area downstream of Union Road were not addressed because we are not proposing any work in this area. If future field surveys determine a need to work in this area, extensive cultural resources studies will be performed. The remaining archaeological concerns were not brought to our attention until after the public comment period had ended. These concerns will be addressed during the preparation of plans and specifications. We will continue our efforts to coordinate with the SHPO throughout any additional cultural resource studies to ensure that all archaeological concerns are adequately addressed. I am confident that all of the historical and archaeological impacts that would result from construction of the Winnepesaukee project can be effectively mitigated.

Our present estimate of \$150,000 for utility relocations is based upon the best available information we could obtain from local city and town engineers and the New Hampshire Water Supply and Pollution Control Commission. We do not have the benefit of detailed field surveys at this time. During the preparation of plans and specifications, detailed surveys will be performed to verify the location and elevation of each utility crossing within proposed work areas. This information will be used to determine a more accurate cost estimate for utility relocations.

Concerns raised by the New Hampshire Fish and Game Department are addressed in our response (copy enclosed) to their letter of February 25, 1985.

I hope my letter adequately addressed your concerns. Should you have any further questions, please contact me at (617) 647-8220. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547. I look forward to our continued coordination during preparation of plans and specifications for the proposed project.

Sincerely,



Carl B. Sciple  
Colonel, Corps of Engineers  
Division Engineer

Enclosures



CITY OF LACONIA, NEW HAMPSHIRE 03246-3472

*"City on the Lakes"*

OFFICE OF: CITY MANAGER

March 7, 1985

RECEIVED

9 MAR 11 1985

NEW HAMPSHIRE  
WATER RESOURCES BOARD

Mr. Delbert F. Downing, Chairman  
NH Water Resources Board  
37 Pleasant Street  
Concord, NH 03301

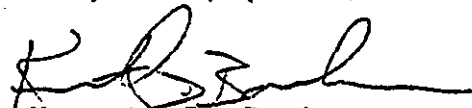
Dear Mr. Downing:

On February 28, 1985 I and my Public Works Director, Frank DeNormandie, met with Donald Repoza of your staff and Peter Hance, a member of your Board, to discuss the city's position vis-a-vis the Corps of Engineers' flood protection plan for the Winnepesaukee River.

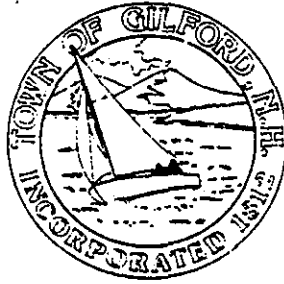
As a result of this discussion the city has taken the position that it will interpose no objection to moving forward with the plan into the design phase of the project. The city takes this position with the understanding that it is not obligated to underwrite the project or any part thereof.

This position is taken not because of the merits of the project but rather because of priorities. The city thusly is in support of H.B. 284.

Very truly yours,

  
Kenneth D. Boehner  
City Manager

cc: F. DeNormandie



## Recreation Center of New Hampshire

March 1, 1985

RECEIVED

MAR 6 1985

NEW HAMPSHIRE  
WATER RESOURCES BOARD

Mr. Delbert Downing  
Chairman  
N.H. Wetlands Board  
37 Pleasant St.  
Concord, NH 03301

Dear Mr. Downing:

The Gilford Board of Selectmen submits the following comments in response to a proposal by the U.S. Army Corps of Engineers for flood protection of the Winnepesaukee River Basin.


The primary effects of the proposal, if implemented, would clearly be favorable to the Town of Gilford. Improved regulation of the Lake Winnepesaukee water level would promote better seasonal planning for the Town's shorefront and recreational users of the Lake. The potential impact of flooding and recreational restrictions on Lake Winnepesaukee could be deleterious to not only Gilford, but to the entire Lakes Region economy.

These comments, however, are submitted without consideration of local funding. If local funding is proposed, we would, by necessity, require an examination of town funding requested, and the cost/benefit ratio of the proposal to the community. In addition, sufficient advance time would be necessary to conduct an evaluation, make recommendations, and appropriate funding.

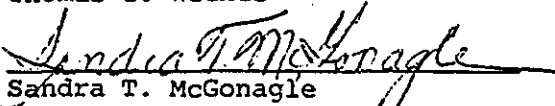
In summary, we are in accord with the objectives of the flood protection proposal, but cannot support the scope of work, unless an acceptable funding projection is specifically enumerated.

Sincerely,

BOARD OF SELECTMEN

  
Lawrence W. Guild, II, Chairman

  
Thomas T. Weekes

  
Sandra T. McGonagle

jk

# STATE OF NEW HAMPSHIRE

## EXECUTIVE DEPARTMENT

JOHN H. SUNUNU, GOVERNOR

CONCORD



### COUNCILORS

WILLIAM P. CAHILL, NORTH HAMPTON

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PETER J. SPAULDING, HOPKINTON

BERNARD A. STREETER, JR., NASHUA



February 26, 1985

Colonel Carl B. Sciple  
U. S. Army Corps of Engineers  
N.E.D.P.L. - PF Building 114-N  
424 Trapelo Road  
Waltham, Massachusetts -2254-9149

Dear Colonel Siple:

On January 21, 1985, I attended the public meeting at the Winnisquam Regional Middle School in Tilton, New Hampshire regarding a local flood protection plan developed by the U. S. Corps of Engineers for the New Hampshire Water Resources Board to reduce flood damage in the Winnepesaukee River Basin.

I am in basic agreement with the plan outlined at the public hearing in that the project will reduce flood damages along the entire length of the Winnepesaukee River and the major lakes in the system, especially the Silver Lake area. It is my understanding from the testimony at the hearing that the Silver Lake area experiences yearly flooding to homes and summer camps due to the channel restriction at the outlet of the lake. It seems to me that the proposal to increase flows in the Winnepesaukee River by removal of obstructions, removing sandbars, and deepening the channel in certain areas is a practical and viable solution to the reduction in high water levels during flooding conditions.

It is my understanding that this project will help reduce flooding both on the several lakes in the area as well as along the river itself as it flows through several communities. Some phases of this project will enhance navigation on sections of the river, help to stabilize water levels on some of our lakes and in the Tioga River marsh and in general will improve the overall management of the Winnepesaukee River Basin.

The environmental analysis portion of this report outlines those measures that will be taken to protect our natural resources, while at the same time provide a means to improve management of the river. The use of State Fish and Game personnel to consult with the Army Corps of Engineers during the execution of several portions of this project should result in the best solution of accomplishing the project goals while protecting the resource.



The increased flood control benefits along the river resulting from increasing the discharge capacity of the stream and improved lake management technics could also result in better use of water for hydro electric production, enhancement of fisheries and other recreational and economic use.

The Winnepesaukee River Basin with its recreational facilities and attraction for tourists throughout the country enhances unmeasurable economic benefit to the state and local communities.

It is therefore, requested that wherever possible, bike trails, walking paths, and other recreational and wildlife projects be incorporated into the proposed plan by the U. S. Corps of Engineers to fully develop the project to its maximum potential.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Ray S. Burton", with a long horizontal flourish extending to the right.

Raymond S. Burton  
Executive Councilor

RSB:k

STATE OF NEW HAMPSHIRE



FISH AND GAME DEPARTMENT

CHARLES E. BARRY  
EXECUTIVE DIRECTOR

Box 2003  
34 Bridge Street  
Concord, N. H. 03301  
(603) 271-3421

February 25, 1985

Colonel Carl B. Sciple  
Division Engineer  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, MA 02254

Dear Colonel Sciple:

The New Hampshire Fish and Game Department has reviewed the draft Environmental Assessment, Winnepesaukee River Flood Control Project. The Draft Environmental Assessment addresses Plan 8, which calls for modifying the spring fill-up and fall draw-down schedule for Lake Winnepesaukee and the removal of 170,500 cubic yards of stream bed material from 2.9 miles of the Winnepesaukee River to allow discharge from the Lakeport Dam to be increased from 2600 c.f.s. to 4000 c.f.s. The Department provides the following comments and position regarding the proposed project.

Comments:

Page 9: The statement "dams and pollution have eliminated annual migrations of spawning shad" is incorrect and no longer accurate. Since 1969 restoration efforts have been carried out by State and Federal fish and wildlife agencies. Our Department, U.S. Fish & Wildlife Service (Dept. of Interior), Massachusetts Division of Fisheries & Wildlife and Marine Fisheries, Department of Commerce, and the U. S. Forest Service (Dept. of Agriculture) have expended 2.95 million dollars which has resulted in increasing spawning runs of Atlantic salmon, American shad, alewives and blueback herring. Dams on the mainstem of the Merrimack and its tributaries continue to be fitted with fish passage facilities. Water quality has improved dramatically throughout the Merrimack watershed as well. The expenditure of 125 million dollars by State, Federal and local agencies and communities pursuant to the Federal Water Quality Act of 1972, Public Laws 92-500, has reduced to the pollution to the Merrimack and Pemigewasset Rivers. In addition, the Winnepesaukee River Basin Pollution Control Program itself cost 65 million dollars.

Page 14: The Recreation Section fails to list the economic benefits to the State and local communities from hunting and fishing on the Winnepesaukee River. Hunting and fishing generates 180 million dollars annually to the State (1980 National Survey of Fishing, Hunting and Wildlife - Associated Recreation, Dept. of the Interior).

Page EA 8-9: In the Recreation Section, levels of hunting and fishing are not included. Total angler days or hunter days per year for the basin are

Colonel Carl B. Sciple  
February 25, 1985  
Page 2.

not mentioned. Hunter and angler days reflect the importance of hunting and fishing to the region. The main report fails to identify any negative economic impact from loss of hunting and fishing due to the loss of fish and wildlife habitats as a result of the proposed project.

Page EA-5: In the Environmental Assessment, Alternatives, there is no plan to utilize existing wetlands and undeveloped floodplain for floodwater retention areas. This alternative could preclude channel modification/s.

Page 38: The proposed mitigation measure involving the bottom-hinged Bascule gate was originally proposed before the development of the draft project as a means to maintain water levels in Silver Lake for recreation, not to maintain the water level in the Tioga wetland. The Corps of Engineers assumes that the level of the Tioga wetland is the same as Silver Lake, yet no data is presented which provides support. The operation of the Bascule gate to satisfy recreational needs of people at Silver Lake will be to the detriment of the Tioga wetland by inundating a shallow marsh by an average of two (2) feet. The New Hampshire Fish and Game Department would oppose any level that would alter the existing Tioga wetland.

Page EA-20: The Corps of Engineers states that "0.5 foot difference in low flow elevation could result in the loss of some wetland habitat...". The statement is contrary to Executive Order 11990, Protection of Wetlands, Clean Water Act of 1977, as amended (42 U.S.C. 185 L-7 et seq.), Table 12, Page 42-44, that states "no direct effects on wetlands would result due to construction activities".

Page EA-21: The Corps states that the proposed project would reduce the aquatic weed problem in Silver Lake. This statement is also contrary to nationally recognized Acts in Table 12, page 42-44. Aquatic vegetation, both emergent and submergent is an important food and cover habitat component for fish and wildlife, particularly juvenile fish and waterfowl. The Environmental Assessment does not include any description of present conditions for waterfowl and what effects the channel modification/s would have on nesting, staging and wintering populations.

The proposed channel modification mitigation measures which call for the replacement of assorted rocks and boulders in the dredged stream bed/s would serve no purpose. Proposed periodic maintenance dredging would prevent recovery of aquatic life. Studies in Vermont show 50% reductions in trout densities in streams dredged only once.

The Corps of Engineers fails to state what effects to fish and wildlife, both stream and riparian, would result from any aspects of the proposed project. In particular the Corps does not state the effects to fish and wildlife from slumping and erosion of newly constructed stream channels and sediment carried by higher velocities in channels. Benthic organisms are a product of bottom area and water depth. Modification of a wide shallow stream to a narrow deeper configuration decreases the productive areas where both benthic and aquatic plants thrive.

Colonel Carl B. Sciple  
February 25, 1985  
Page 3.

Page 37: The Corps states that the New Hampshire Water Resources Board has located suitable disposal sites for dredged materials at nearby landfills. The sites and impacts from the disposal have not been identified.

Page 7: In Section 404(6) Effects on Nekton the Corps states that "finfish would be able to move out of the work area and would not be adversely affected by the resulting discharge" (during dredging). The evaluation does not consider effects to young-of-year and juvenile fish are incapable of escaping the work area. Any displacement of juvenile fish from nursery areas which provide escape cover would subject them to excessive predation. Also, the Corps does not assess effects to downstream benthos and other aquatic life from siltation from proposed channel modification/s.

No cost/benefit ratio was determined for the proposed spring fill-up and fall draw-down schedule for Lake Winnepesaukee. Possibly if this scheme was treated as a separate alternative it would preclude the proposed channel modification/s.

#### SUMMARY:

The Winnepesaukee River supports significant fishery resources. In particular, the river supports excellent habitat for smallmouth bass, landlocked salmon, smelt, white perch, yellow perch, brook trout, rainbow trout and brown trout. The New Hampshire Fish and Game Department stocks the river annually with about 2,000 brook and brown trout. The Winnepesaukee River in downtown Laconia offers angling for landlocked salmon which few metropolitan areas can match. The Winnepesaukee River also offers significant habitat for waterfowl. Concentration of mallards, black ducks, wood ducks and hooded mergansers nest and stage throughout the river. Migratory waterfowl such as the species above as well as blue-winged teal, green-winged teal, common mergansers, Canada geese and common goldeneyes utilize the river during migrations. Black ducks, mallards, common goldeneyes, common mergansers, and hooded mergansers utilize the river for winter habitat. Other wildlife found in the river area are muskrat, beaver, mink, otter, white-tailed deer, herons, shorebirds, hawks and song birds.

The New Hampshire Fish and Game Department does not object to the fall draw-down as proposed for Lake Winnepesaukee. This scheme will have no impacts on fish and is consistent with the goals of the Strategic Plan for the Management of Lake Trout in New Hampshire. However, the proposed spring fill-up as presented in the Lake Filling Guide Curve most likely will have a negative impact on nesting common loons. The lake level increase for May as proposed would be more rapid than historical averages and therefore would threaten most loon nests by flooding. Common loons on Lake Winnepesaukee begin nest construction in early May and their nests are constructed slightly above water level. The common loon Gavia immer is legislated as a State Threatened Species in NH. The Department has also determined that the proposed dredging of 3,000 cubic yards of material from under the Daniel Bridge in Franklin (Reach #1) and 11,000 cubic yards of material in Lakeport between the railroad bridge and Elm Street (Reach #6) is not particularly detrimental. The dredging of material only at the outlet of Jewett Brook and immediately upstream of Avery Dam (in Reach #5) will have minor impact on fish and wildlife.

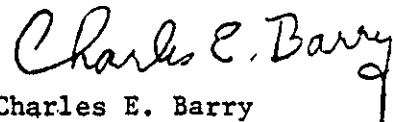
Colonel Carl B. Sciple  
February 25, 1985  
Page 4.

The Department recommends an increase in the width of the Lochmere channel (Reach #3B) by excavating the bank(s) to increase channel flood flow capacity would have less impact on fish and wildlife than deepening the existing shallow streambed.

The Department is opposed to the dredging of 154,500 cubic yards of stream substrate from 2.8 miles of the Winnepesaukee River in Reaches #2, #3A, #4 and excavation of areas not previously permitted above as it would have a significant, lasting, adverse impact on fish and wildlife and their habitats. The Department also maintains that no amount of mitigation will rectify or balance damage to fish and wildlife habitat incurred by channel or stream dredging.

The New Hampshire Fish and Game Department has provided comments and has taken the aforementioned position in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and New Hampshire RSA 206:9 and 206:10.

Sincerely yours,



Charles E. Barry  
Executive Director

CEB:WCI:emb

cc: Raymond S. Burton, Executive Councilor  
Peter J. Spaulding, Executive Councilor  
Rep. Barbara Bowler  
Rep. James White  
James G. Paine, D.V.M., F&G Commissioner  
Gordon Freeman, F&G Commissioner  
Gordon Beckett, USF&WS  
Delbert F. Downing, Chairman, WRB  
Charles F. Thoits, III  
Howard C. Nowell, Jr.  
William C. Ingham, Jr.  
Robert Carlson  
Stephen A. Virgin, P.E.  
Sue Brown, USACE  
Lesley N. Corey, Jr., Exec. Director, Audubon Society  
Greg Smith, MRWC  
Jeff Fair, Director, LPC



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

April 25, 1985

REPLY TO  
ATTENTION OF  
Planning Division  
Plan Formulation Branch

Mr. Charles E. Barry  
Executive Director  
Fish and Game Department  
Box 2003  
34 Bridge Street  
Concord, New Hampshire 03301

Dear Mr. Barry:

I am writing in response to your letter of February 25, 1985 in which you express several comments and concerns regarding our investigation of flooding conditions within the Winnepesaukee River Basin.

Your comments concerning anadromous fisheries restoration within the Merrimack River Basin and the economic benefits to the State and local communities from hunting and fishing along the Winnepesaukee River, as well as our responses to your other concerns, will be incorporated into our final report. I would also be happy to include any additional information your office could provide concerning total angler and hunter days per year for the basin.

In paragraph 1 of page 2, you indicate that a plan to utilize existing wetlands and undeveloped floodplains for floodwater retention areas was not examined. Wetlands and undeveloped floodplains retain floodwater under existing conditions. Why alter these areas when they currently act as floodwater retention areas? In addition, you state in your next paragraph that you would oppose any alteration of existing wetlands.

In paragraph 2 of page 2, you indicate that the bottom-hinged gate was designed to maintain water levels in Silver Lake for recreation. Channel excavation measures were designed to allow the New Hampshire Water Resources Board (NHWRB) the ability to pass flows of 4,000 cubic feet per second through this reach without worsening existing flood conditions. This work alone would reduce water levels in both Silver Lake and Tioga Wetland during average to low flow periods. The bottom-hinged gate was designed to provide the NHWRB the ability to duplicate existing water level conditions. The decision on how the bottom-hinged gate is to be operated to best meet the flood control, recreation, and environmental needs of the area lies with the NHWRB. It is anticipated that the NHWRB will lower the gate during periods of high flows to reduce the extent of flooding. It is also anticipated that the NHWRB will keep the gate in the raised position during periods of low

flow which usually occur during the summer months, to maintain the level of Silver Lake at normal full pool. Silver Lake usually drops approximately 1 to 2 feet below full pool, sometimes more, during the summer months which restricts recreational use of the lake. The NEWRB could also lower the gate during low flow periods to duplicate normal summer decreases.

In paragraph 2 of page 2, you also state that there is no data in our report to support our assumption that the water level of Silver Lake is similar to that of Tioga Wetland. Our assumption is based on the fact that these are adjacent water bodies that are controlled by the same downstream restriction. This is a rationale assumption that is supported by backwater computations, the results of which are graphically displayed on Plate 1-16, Index Station No. 3A.

In paragraph 3 of page 2, you indicate that statements made on page EA-20 and in Table 12 of our report are contradictory. These statements describe two different conditions. The statement on page EA-20 describes the impacts of channel improvements "without" the bottom-hinged gate. The statements in Table 12 describe the impacts of channel improvements "with" the bottom-hinged gate.

In paragraph 4 of page 2, you mention the impacts of the proposed bottom-hinged gate on aquatic vegetation in Silver Lake. As previously explained, the hinged gate can be operated to duplicate existing water levels, which would have no impact on aquatic weed growth. However, the gate can also be operated to maintain the level of Silver Lake slightly higher during the summer months for added recreation. Although deeper water levels in Silver Lake could slightly reduce aquatic weed growth, the decision on how to operate the gate to best meet and balance the needs of recreation, hydropower, and environmental interests lies with the NEWRB.

In paragraph 5 of page 2, you indicate that the placement of rocks and boulders in dredged areas would serve no purpose. This statement is contrary to ones made by Bill Ingham, of your staff, and Fred Benson and Vern Lang, of the U.S. Fish and Wildlife Service, at coordination meetings held on March 21, 1984 and April 11, 1984. During these meetings, Messrs. Ingham, Benson and Lang recommended that an assortment of rocks and boulders be placed in the channel after dredging to restore riffles and pools which provide excellent fish habitat. This work would only be performed in areas where the existing channel bottom contains an assortment of rocks and boulders. Stream velocities in these areas are sufficient to prevent the collection of sediments and other debris which might require future maintenance.

In this same paragraph, you state, "Proposed periodic maintenance dredging would prevent recovery of aquatic life." The State of New Hampshire and city of Laconia have been performing periodic dredging and bridge repairs along the Winnepesaukee River in downtown Laconia for years. In the last few years alone, they have dredged from the confluence of Jewett Brook to Avery Dam, repaired Church and Main Street Bridges, and dredged the area just

upstream of the inlet to Winnisquam Lake. If periodic channel work prevents recovery of aquatic life, then based on the amount of recent channel work in downtown Laconia, there should be little or no aquatic life in this reach of the river. Yet, in paragraph 4 of page 3, you state, "The Winnepesaukee River in downtown Laconia offers angling for landlocked salmon which few metropolitan areas can match."

Several questions were raised during the public review period concerning the frequency of periodic channel maintenance. Although it is impossible to predict exactly where and how often channel maintenance will be required, it is possible to identify potential problem areas through analysis of estimated river velocities and existing channel bottom conditions. Sediment accumulation usually occurs in areas where there are sudden decreases in river velocities, which cause sediments to drop out of suspension. This generally occurs at the inlet of lakes and in ponding areas just upstream of dams. It is not expected that future channel maintenance will be required along Reaches 2, the lower portion of 3A, 3B, and most of 4 because river velocities in these areas are sufficient to carry sediments downstream. This is evident by the rocky river bottom in these areas. Future maintenance dredging is expected to be required at the inlet of Winnisquam Lake and just upstream of Lakeport, Avery and Lochmere Dams and the proposed bottom-hinged gate. The city of Laconia periodically removes sediment accumulations at the inlet of Winnisquam Lake and dredging just upstream of the three existing dams is part of the normal operation and maintenance of these structures. Periodic channel maintenance after project construction is not expected to be much greater than under existing conditions.

In paragraph 5 of page 2, you also refer to studies performed in Vermont which showed 50 percent reductions in trout densities in streams dredged only once. Emergency channelization work in Vermont was performed following the disastrous flood of June 1973. Trout density studies were performed along the most severely altered sections of river in Vermont, many of which were completely relocated or widened and involved the removal of all streambank vegetation and shade trees. This work was performed during the trout spawning season with no mitigation measures or consideration for fish and wildlife resources in the area. These streams also contained self-sustaining populations of trout. Proposed channel work along the Winnepesaukee River would not be performed during the trout spawning season. This work would be restricted to the center portion of the channel to preserve streambank vegetation and shade trees. Mitigation measures would include the placement of rocks and boulders in the channel after dredging to restore fish habitat, as previously noted. The Winnepesaukee River does not contain self-sustaining populations of trout, it is stocked. Based on these significant differences, it is reasonable to expect that reductions in trout densities along the Winnepesaukee River would be far less than 50 percent. In fact, one of the Vermont streams studied, Avery Brook, which had similar channelization work to that proposed along the Winnepesaukee River, only showed a 14 percent reduction in trout densities.



In paragraph 6 of page 2, you question the impacts of slumping and erosion of newly constructed stream channels and changes in river velocities on fish and wildlife. Proposed stream channels would be constructed with 1 vertical on 2 horizontal side slopes to minimize slumping of the stream-banks. Erosion of newly constructed stream channels would be minimized by replacing existing bottom material, namely rocks and boulders, in areas that experience high river velocities. After project construction, slightly higher river velocities would only be experienced during periods of severe flooding. The effects of these changes in river velocities are discussed throughout the Environmental Assessment.

In paragraph 1 of page 3, you indicate that disposal sites and the impacts of dredge disposal have not been identified. The NHWRB has assumed responsibility for disposal of dredged material. They have been in contact with officials from Laconia, Tilton and Franklin to discuss the use of local landfills as disposal sites. The NHWRB is also investigating the possibility of selling dredged material for use in local construction activities to reduce project costs. Based on the findings of our physical and chemical testing of samples collected from areas to be dredged, these methods of disposal represent little potential for adverse impacts.

We concur with your statements in paragraph 2 of page 3, that young-of-year and juvenile fish which may not be capable of escaping dredging operations would be lost, and that those which can swim would be subject to increased predation. There would also be some loss of nursery habitat which is generally located along streambanks and in backwater areas. Permanent loss of nursery habitat would be minimized by restricting dredging operations to the center portion of the channel so as not to disturb the streambanks, and by the placement of rocks and boulders in the channel after dredging to restore small backwater areas.

In paragraph 2 of page 3, you also question the effects of siltation from proposed channel work on downstream benthos and other aquatic life. Physical testing of sediment samples taken in areas to be dredged revealed this material to be predominantly of large grain size which should settle out of suspension before entering downstream systems. The effects of suspended sediments on downstream benthos and other aquatic life would be further minimized by restricting construction operations to low flow periods, the use of sediment controls such as silt fences, and the operation of the dams along the Winnepesaukee River to regulate flows in the work areas.

In paragraph 3 of page 3, you indicate that cost/benefit ratios were not determined for the proposed spring fill-up or fall draw-down schedules and that these measures were not treated as separate alternatives. There are virtually no costs associated with the implementation of the proposed spring fill-up and fall draw-down schedules. Determining their benefit/cost ratio

would be inappropriate because their annual benefits, regardless of the amount, would be divided by zero costs which in all cases would equal a benefit/cost ratio of infinity. Table 9 on page 32 of our report lists the proposed spring fill-up and fall draw-down schedules as separate alternatives.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8220. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

Sincerely,

Carl B. Sciple  
Colonel, Corps of Engineers  
Division Engineer

Lockmere, N. H.

February 15, 1985

Department of the Army  
New England Division Corps of Engineering  
Waltham, Mass.

Gentlemen:

As a resident of Silver Lake I would like to go on record as approving the dredging in the Winnepesaukee River basin and the proposed king-gate for Silver Lake.

We have been year round residents of Silver Lake since 1956. Our house is 74 ft. from the water's edge. In the spring we've always experienced high water though it has never been a threat. We've never owned or had need of a sump pump in all these years. However in December 1983 we experienced flooding which made it necessary for us to sandbag our cellar doorway and to buy our first sump pump. Because of the severe cold the sandbags were frozen into position for the remainder of the winter. This caused us some concern since it blocked one of the two exits of the house. As the weather warmed up the family was urging me to remove the bags, but I was determined to wait until spring run-off. There was no problem at this time so I emptied and dried the bags and put them away. Within a

2.

Couple weeks (or so it seemed) I was back on the sandbag detail. The water was up so high. I couldn't believe it. One pump and 75 sandbags was inadequate so I rented another pump and filled more bags.

Enclosed are pictures as waters were receding after this flood period. Notice water mark on wall.

It is difficult to remember since one day seemed to merge into another because I took only occasional naps always on the alert to be sure the pumps were working. When I noticed the water rising again and fast. Now I had 4 pumps recycling the water and over 125 sand bags on either side of the door. It looked so grim that I had my daughter pack the car with some clothing, and provisions for our pets and be ready to evacuate.

The water at this time was 7 ft. higher than normal.

Gloria Sawicki

P.O. Box 83

Blackmore, Vt. H. 03252





## The Sant Bani Press

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February 14, 1985

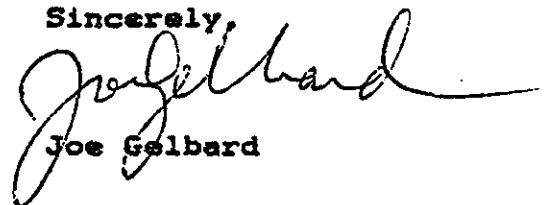
Mr. Delbert Downing  
NH Water Resources Board  
37 Pleasant Street  
Concord, NH 03301

Dear Mr. Downing,

This is to express my personal support, and also on behalf of my company, for the proposed Winnepesaukee River Basin Project. I attended the meeting in Tilton at the Middle School to hear your presentation. It is clear that there is a flooding problem which is not going to get better by itself. I feel that the US Army Corps of Engineers has studied the problem responsibly, and that we should get behind the plan so that work can begin soon.

I appreciate the hard work done by your office on behalf of this project, and also last June at the time of the flooding. I hope the local and state governments will endorse this project.

Sincerely,



Joe Gelbard



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P.O. BOX 1518  
CONCORD, NEW HAMPSHIRE 03301

Colonel Carl B. Sciple  
Division Engineer  
U.S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254

EEB 14 1985

Dear Colonel Sciple:

This is our Fish and Wildlife Report on the Winnepesaukee River Basin, Local Flood Protection Project, New Hampshire. It has been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Your Draft Detailed Project Report (DDPR) presents Plan 8 as the recommended plan for local flood protection within the Winnepesaukee River Basin. This plan consists of modifying the existing spring fill-up and fall draw-down schedules of Lake Winnepesaukee in combination with the construction of a system of channel modifications along the Winnepesaukee River that will allow discharges from Lakeport Dam to be increased from 2,600 cfs to 4,000 cfs. The proposed channel modifications are as follows:

Reach 1, Franklin--Remove approximately 3,000 cubic yards of material from under Daniel Bridge. Lower J.P. Stevens Dam 2 feet and add new flashboard system.

Reach 2, Tilton/Northfield--Channelize the 2,300 feet of stream between the two railroad bridges; 17,000 cubic yards of material to be removed. Replace piers and decking of railroad bridge downstream of Park Street.

Reach 3A, Silver Lake--Channelize the 6,000 feet of stream between the outlet of Silver Lake and Interstate 93; 46,000 cubic yards of material to be removed. Construct bottom-hinged gate about 140 feet downstream of Route 40 bridge.

Reach 3B, Lochmere--Channelize the 800 feet of stream between the outlet of Winnisquam Lake and Union Road; 3,500 cubic yards of material to be removed.

Reach 4, Laconia (downstream of Avery Dam)--Channelize the 2,860 feet of stream between Avery Dam and the inlet of Winnisquam Lake; 20,000 cubic yards of material to be removed.

Reach 5, Laconia (upstream of Avery Dam)--Remove approximately 70,000 cubic yards of material from the 2,800 feet of channel between Messer Street Bridge and Avery Dam. Floodproof one commercial building and provide ten raised utility rooms.

Reach 6, Lakeport--Remove approximately 11,000 cubic yards of material from the 900 feet of channel between the railroad bridge and Elm Street. Replace center pier of Gold Street trestle bridge. Remove U.S.G.S. gaging station.

We understand that channelization would be restricted to the streambed in order to minimize disturbance of streambank vegetation. An assortment of rocks and boulders would be placed on the channel bottom after excavation in an attempt to restore fish habitat. Excavated material would be temporarily stockpiled in or near the river and allowed to drain before transporting to designated disposal areas. The State of New Hampshire Water Resources Board (NHWRB) would be required to maintain channel modifications after project completion. This would involve periodic channel work to remove sediment deposits that infringe upon the carrying capacity of the channel.

The DDPR/Environmental Assessment (EA) concludes that Plan 8, which includes channelization of nearly 3 miles of stream resulting in the removal of 170,500 cubic yards of bottom material, would have no significant adverse impacts upon fish and wildlife resources. We agree that modifying the existing spring fill-up and fall draw-down schedule of Lake Winnepesaukee, as proposed, would not be detrimental to fish and wildlife resources. We also agree that the proposed channel modifications in Reach 1, Franklin, and Reach 6, Lakeport, would have only minor adverse impacts upon fish and wildlife resources. However, we object to the proposed channelization of the remaining reaches (Reaches 2, 3A, 3B, 4 and 5) and do not believe the project documents have adequately addressed the adverse environmental impacts associated with the channelization aspects of this project.

The disposal of dredged material, approximately 170,500 cubic yards, has not been adequately addressed in the project documents. Although it is stated (Main Report, page 37) that the "NHWRB has located suitable disposal sites at nearby landfills" these areas have not been identified and the potential adverse impacts of disposal have not been evaluated. Overall project impacts cannot be properly determined until disposal areas for dredged material have been clearly identified and evaluated.

The project documents rather cursory treatment of the impact of channelization upon benthic organisms is inadequate and needs expansion. On page 3, the Section 404(b)(1) Evaluation states that "Organisms would recolonize the areas within a couple months after work is completed." We acknowledge that recolonization would occur, however, we contend that the recolonization of benthic organisms within the channelized areas would take more than two months. In Reaches 1, 3B, 5 and 6 channel work would occur between July and November or at the tail end of the growing season. Thus, a significant



recovery of the full spectrum of benthos in these areas would not be expected until the following growing season. Reaches 3A and 4 are located directly below ponded water and would be deprived of the benthic stream drift that could rapidly recolonize the channelized area.

All of the areas proposed for channelization support significant fishery resources. Reaches 2, 3A and 4 are of special significance because of excellent trout, landlocked salmon and smallmouth bass habitat. Channelization would severely alter existing habitat and drastically reduce the stream's fish carrying capacity. Studies in Vermont<sup>1</sup> reveal that reductions in trout density in the vicinity of 50% can be expected with most substantial instream modifications. Therefore, it would not be unrealistic to expect a similar reduction of carrying capacity in the reaches proposed for channelization in the Winnepesaukee River. We recognize that the proposed mitigation measures (placement of rocks and boulders in the channelized areas) would reduce the overall loss of fish habitat. However, we do not believe that these mitigation measures would fully compensate for habitat losses and the proposed project would result in the long term impairment of fishery resources.

The channelized stream reaches would be subject to maintenance on a periodic basis in order to remove any newly collected sediments that infringe upon the flood carrying capacity of the channel. This maintenance would be disruptive to fish and wildlife communities and could result in the continued impairment of fish and wildlife habitat. The project documents fail to discuss the potential adverse impacts associated with maintenance of the project.

Eager Island, a wetland area in Reach 4, could be adversely impacted if dredging resulted in a lowering of water levels. The EA, page 22, states that "Water levels in the Eager Island area would not be lowered by the proposed work. Water levels in this area are maintained by Winnisquam Lake..." However, no water surface elevations are given to verify this statement.

Our Planning Aid Letter of January, 1983, recommended that channelization in Reach 3A be dropped from further consideration and that non-structural measures be implemented for the Silver Lake area. In addition, we recommended that the Tioga River wetland be thoroughly investigated for inclusion in the overall flood control program as a natural valley storage area. Although the project documents include an investigation of non-structural measures they were dropped from further consideration since channelization is perceived by the Corps to be a more cost effective flood control measure. We fail to find a discussion on the merits of natural valley flood control storage in the project documents.

<sup>1</sup> Gersmehl, J.; Meyers T. Effects of Stream Channelization on Trout Population of the White River, Vermont. Washington, D.C.: U.S. Fish and Wildlife Service, Office of Biological Services; 1982.

The Tioga River wetland upstream of Route 140, near Silver Lake, is important as a nesting, feeding, and resting area for waterfowl such as Black Ducks, Mallards and Wood Ducks. It provides valuable habitat for muskrats, mink, raccoon, beaver, white-tailed deer and a large variety of song birds. In addition, the Winnepesaukee River in Reach 3A remains essentially ice-free during the winter months and provides valuable winter habitat for such waterfowl species as Black Ducks, Mallards, Common Goldeneye and Common and Hooded Mergansers. In accordance with the Fish and Wildlife Service Mitigation Policy, we consider the Winnepesaukee River and adjacent wetlands to be Resource Category 2.

The project documents conclude that channelization of Reach 3A and construction of the bottom-hinged gate below Route 140 would have no significant adverse impact upon fish and wildlife resources. However, in our opinion, these documents fail to provide sufficient data to warrant such a conclusion. It is assumed that water level conditions in the Tioga River wetland are similar to those of Silver Lake. No data are provided on the frequency, duration, and extent of flooding in the Tioga River wetland under conditions of without and with the project. It is stated that the bottom-hinged gate would stabilize water levels in Silver Lake and the Tioga wetland. However, the project documents fail to recognize that the main factors controlling plant species composition in wetlands are the extent, frequency and duration of flooding. With the bottom-hinged gate in operation to stabilize water levels and prevent future flooding, the overall composition of plant species and therefore wildlife habitat values of the wetland areas are bound to change. These issues need to be thoroughly addressed in the project documents.

The ice-free conditions in Reach 3A could be jeopardized by the project. Channelization of the river would deepen the channel and the bottom-hinged gate would increase the average water level by about 2 feet. This could cause the river to freeze over during the winter months and result in the loss of valuable wintering habitat for waterfowl. Reaches 3B and 5 are also essentially ice-free during the winter and are heavily utilized by waterfowl. Deepening the channel in these reaches could also cause the river to freeze over during the winter and result in a loss of valuable wintering habitat for waterfowl. The project documents fail to discuss this potential loss of waterfowl wintering habitat.

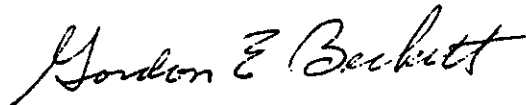
In our opinion, the Finding of No Significant Impact attributable to the proposed project (Plan 8) is not justified. A number of significant issues associated with the channelization aspects of this project need to be resolved. These issues are as follows: (1) the identification and evaluation of dredged material disposal sites, (2) the impacts of channelization and

subsequent channel maintenance upon benthic resources, fish habitat and fishery resources, (3) the impacts of channelization upon wetlands, and (4) the impacts of channelization upon waterfowl wintering habitat.

We are opposed to the recommended plan (Plan 8) as proposed. We believe that implementation of the proposed project will have a significant adverse impact upon the human environment and, therefore, will require an Environmental Impact Statement.

We can support modification of the spring fill-up and fall drawn-down schedules of Lake Winnepesaukee which accounts for nearly 75 percent of the flood control benefits. In addition we can support non-structural measures for the downstream area including flood proofing, relocation, flood warning systems, land use regulation and zoning, the National Flood Insurance Program and certain structural measures pertaining to bridges and dams. We are confident that a satisfactory solution to the flood control problem will evolve from a rigorous evaluation of non-structural measures in conjunction with modification of the spring fill-up and fall draw-down schedules of Lake Winnepesaukee.

Sincerely yours,

A handwritten signature in cursive script that reads "Gordon E. Beckett". The signature is written in dark ink and is positioned above the typed name.

Gordon E. Beckett  
Supervisor  
New England Field Office



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

April 25, 1985

Planning Division  
Plan Formulation Branch

Mr. Gordon E. Beckett, Supervisor  
New England Field Office  
U.S. Fish and Wildlife Service  
P.O. Box 1518  
Concord, New Hampshire 03301

Dear Mr. Beckett:

I am writing in response to your letter of February 14, 1985, in which you express several concerns regarding our investigation of flooding conditions within the Winnepesaukee River Basin.

In paragraph 3 of page 2, you indicate that the potential adverse impacts of dredge disposal cannot be properly determined until a disposal site is identified. If the dredge material is clean, identification of a disposal site is not critical in determining potential adverse impacts. Physical and chemical testing of samples collected in areas to be excavated revealed that this material is predominantly sandy or gravelly in nature. Of the 20 samples collected by the Corps in 1983, only 2 contained greater than 15 percent fines passing the #200 U.S. Standard Sieve. These 2 samples were located just upstream of Church Street Bridge and contained moderate amounts of organics and contaminant metals. It is recommended in our report that the material removed from this area be disposed of at a suitable upland site. The New Hampshire Water Resources Board (NHWRB) has assumed responsibility for the disposal of dredged material. They have been in contact with officials from Laconia, Tilton and Franklin to discuss the use of local landfills as disposal sites. The NHWRB is also investigating the possibility of selling dredged material for use in local construction activities to reduce project costs. Based on the findings of our physical and chemical testing of dredge material, these methods of disposal present little potential for adverse impacts.

In paragraph 4 of page 2, you discuss the impacts of channelization on benthic organisms. We concur with your statement that recolonization of benthic organisms will not occur until the following growing season. Our Environmental Assessment will be modified to incorporate your comments.

In paragraph 1 of page 3, you indicate that proposed channelization work along the Winnepesaukee River would severely alter existing habitat and drastically reduce the stream's fish carrying capacity. Your findings are based on studies in Vermont which revealed average reductions in trout densities of about 50 percent in altered sections of stream. Emergency channelization work in Vermont was performed following the disastrous flood of June 1973. Trout density studies were performed along the most severely

altered sections of river in Vermont, many of which were completely relocated or widened and involved the removal of all streambank vegetation and shade trees. This work was performed during the trout spawning season with no mitigation measures or consideration for fish and wildlife resources in the area. These streams also contained self-sustaining populations of trout. Proposed channel work along the Winnepesaukee River will not be performed during the trout spawning season. This work will be restricted to the center portion of the channel to preserve streambank vegetation and shade trees. Mitigation measures will include the placement of an assortment of rocks and boulders in the channel areas after dredging to restore fish habitat. The Winnepesaukee River does not contain self-sustaining populations of trout, it is stocked. Based on these significant differences, it is reasonable to expect that reductions in trout densities will be far less than 50 percent and that proposed channel work will not result in a significant long-term impairment of fishery resources.

In paragraph 2 of page 4, you indicate that the impacts of periodic channel maintenance are not discussed in the report. Although it is impossible to predict exactly where and how often channel maintenance will be required, it is possible to identify potential problem areas through analysis of estimated river velocities and existing channel bottom conditions. Sediment accumulation usually occurs in areas where there are sudden decreases in river velocities, which cause sediments to drop out of suspension. This generally occurs at the inlet of lakes and in ponding areas just upstream of dams. It is not expected that future channel maintenance will be required along Reaches 2, the lower portion of 3A, 3B, and most of 4 because river velocities in these areas are sufficient to carry sediments downstream. This is evident by the rocky river bottom in these areas. Future maintenance dredging is expected to be required at the inlet of Winnisquam Lake and just upstream of Lakeport, Avery and Lochmere Dams and the proposed bottom-hinged gate. The city of Laconia periodically removes sediment accumulations at the inlet of Winnisquam Lake and dredging just upstream of the three existing dams is part of the normal operation and maintenance of these structures. Periodic channel maintenance after project construction is not expected to be much greater than under existing conditions. This information will be added to the report.

In paragraph 3 of page 3, you state, "Eager Island, a wetland area in Reach 4, could be adversely impacted if dredging resulted in a lowering of water levels." This same concern was raised by Mr. Fred Benson, of your staff, at a March 21, 1984 coordination meeting among our organizations. A follow-up meeting was held on April 11, 1984 to address this concern. It was explained that water levels around Eager Island would be maintained by Winnisquam Lake, which is located just downstream of the island and has a normal full pool elevation of 482.0 feet NGVD. Water surface elevations were provided to Mr. Benson at the April 11 meeting. The normal full pool elevation of Winnisquam Lake will be added to Plate 10 to verify the statement that dredging will not lower water levels around Eager Island.

In paragraph 4 of page 3, you mention that in one of your earlier letters you recommended that Tioga Wetland be investigated for inclusion in the overall flood control program as a natural valley storage area. This is another issue that was discussed during the March 21 and April 11, 1984 coordination meetings. Tioga Wetland is currently a natural flood storage area. Its flood storage capacity has been investigated and is graphically displayed on Plate 1-17. Local, State and Federal building restrictions should prevent future development in Tioga Wetland, therefore, there is no need to include natural valley storage in this area as part of our project.

In paragraph 2 of page 3, you indicate that based on our assumption that water level conditions in Tioga Wetland are similar to those of Silver Lake, and our lack of data on the frequency, duration and extent of flooding in Tioga Wetland that we cannot conclude that channelization of Reach 3A and construction of the bottom-hinged gate would have no significant adverse impact upon fish and wildlife resources in this area. Our assumption that water levels in Silver Lake and Tioga Wetland are similar is based upon the fact that these are adjacent water bodies that are controlled by the same downstream restriction. This is a rationale assumption which is supported by backwater computations. Data on the frequency, duration and extent of flooding in Reach 3A, which includes Tioga Wetland, under both "with" and "without" project conditions are shown on Plates 1-16 through 1-21.

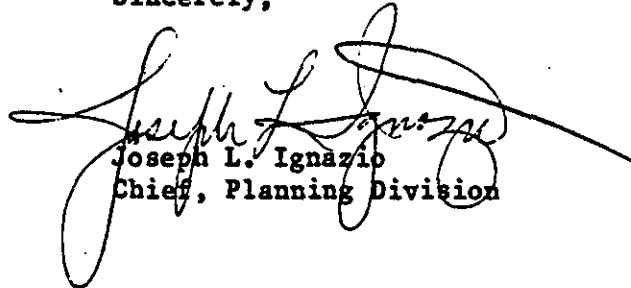
Channel modifications were designed to allow the NHWRB the ability to pass flows of 4,000 cubic feet per second through this reach without worsening existing flood conditions. This work alone would reduce water levels in both Silver Lake and Tioga Wetland during average to low flow periods. The bottom-hinged gate was designed to provide the NHWRB the ability to duplicate existing water level conditions. The decision on how the bottom-hinged gate is to be operated to best meet the flood control, recreational, environmental needs of the area lies with the NHWRB. It is anticipated that the NHWRB will lower the gate during periods of high flows to reduce the extent of flooding. It is also anticipated that the NHWRB will keep the gate in the raised position during periods of low flows, which usually occur during the summer months, to maintain the level of Silver Lake at normal full pool. Normally Silver Lake drops approximately 1 to 2 feet (sometimes more) below full pool during the recreation season. The proposed project will not prevent future flooding, merely reduce the extent of flooding. Water levels in Tioga Wetland will continue to fluctuate, with some regulation possible by the NHWRB through the operation of the bottom-hinged gate. The effects of having water levels in Tioga Wetland slightly lower during flooding events (as shown on Plate 1-16, Station No. 3A) and 1 to 2 feet higher during the summer months would not reduce the overall productivity of Tioga Wetland.

In paragraph 3 of page 4, you state, "The ice-free conditions in Reach 3A could be jeopardized by the project." Ms. Sue Brown and Mr. Dave Goodrich of my staff visited the project area on February 7, 1985. With the exception of a small area near the Route 140 bridge, the upper portion of Reach 3A near Tioga Wetland was completely iced over. Ice-free conditions do not exist in Reach 3A and, therefore, can not be jeopardized by the project.

Paragraph 3 of page 4 also talks about ice-free conditions in Reaches 3B and 5. Excavation of a small section of Reach 3B will not cause the entire reach to freeze over. In Reach 5, the operation of Avery Dam keeps the surface water moving and prevents it from freezing, not the depth of water. If the operation of Avery Dam remains the same, ice-free conditions in this reach will remain.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich has coordinated this investigation and can be reached at (617) 647-8547.

Sincerely,



Joseph L. Ignazio  
Chief, Planning Division



## AUDUBON SOCIETY OF NEW HAMPSHIRE

3 SILK FARM RD. • P.O. BOX 528-B • CONCORD, NH 03301 • 224-9909

February 13, 1985

Col. Carl B. Sciple  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, MA 02254

Dear Col. Sciple:

RE: Proposed Winnepesaukee River Flood Control Project

The Audubon Society of New Hampshire, an independent, non-profit organization with more than 6000 members, wishes to express its opposition to the channelization portion of the proposed Winnepesaukee River Flood Control Project.

We base our opposition on the following points:

1. We feel that non-structural alternatives to the costly, environmentally damaging stream channelization proposal have not been adequately investigated.

There is no evidence that the Corps of Engineers undertook any evaluation of flood storage capabilities of streams flowing into Lake Winnepesaukee. If there is any possibility of manipulating the streamflow into the lake, it should be given serious consideration as an alternative to the costly channelization project proposed by the Corps. It seems to us that within a watershed this size, storage capabilities of incoming streams and wetlands would be significant.

There would appear to be more flood-control potential in lake level manipulation alone than what the Corps recognizes. We do not find the Corps' argument for rejecting a lower lake level adequate or convincing. The only "danger" associated with a lower lake level that was identified by the Corps was that new development might creep to the adjusted level, thereby again increasing potential flood damage (p. 22, Draft Project Report and Environmental Report). This could be prevented by local communities through zoning ordinances.

We feel that a comprehensive lake level regulation scheme should be investigated as an alternative by itself prior to coupling it with downstream channelization. Channelization markedly increases the project's cost and negative environmental impacts.



2. We find the environmental impact of the downstream channelization totally unacceptable, given the inadequate consideration of non-structural alternatives.

The explanation given by the Corps at the public meeting in Tilton on January 21, 1985, for its finding of no significant environmental impact was that all impacts would be mitigated. While mitigation measures may reduce environmental damage, it is simplistic, to say the least, to conclude they will nullify all impacts in this project. This is the same as saying there is no difference between the pre-construction condition and the post-construction condition. We also feel that the impact of the maintenance requirements should be included in impact evaluation. Even though maintenance will be a state responsibility, it is part of the project's impact.

The N.H. Fish and Game Department at the January 21st meeting opposed the entire channelization portion of the project because of "significant lasting adverse impact." Written statements incorporated in the project report as well as public comments attest to the significant and continuing public concern regarding the project's impact on natural and historic resources. We share this concern.

3. We strongly object to a process which asks citizens to give final approval to a project requiring public money -- federal, state, and local -- prior to the determination of the final cost.

We are being asked to agree to the spending of \$5.2 million of public money with no assurance that the final price tag, after more detailed investigation, will not be significantly higher. We appreciate the opportunity to provide input early in a project, but the public should also be allowed opportunity to comment on the final plans, specifications, and cost of a project, especially when any increase in cost will be borne directly by the state and local communities.

We would also like to make the following comments on the content of the Detailed Project Report/Environmental Assessment document:

1. On pages 9 and 10 of the Project Report, there is no mention of the presence of endangered and threatened species. While the Environmental Assessment does include this information, we feel the Project Report should also.

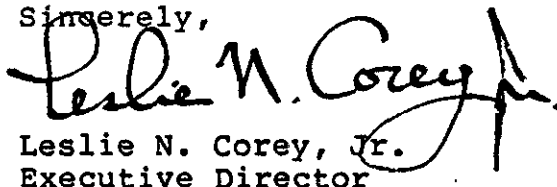
2. On page 14 of the Environmental Assessment, additional information and corrections are needed in the section on Endangered and Threatened Species. The Bald Eagle is

actually listed as endangered under the New Hampshire Endangered Species Conservation Act (changes underlined). Lake Winnepesaukee is an historical nesting area for the Bald Eagle and may have potential for reoccupation. In fact, an immature Bald Eagle spent several days in August 1984 on the stretch of the Winnepesaukee River between Silver Lake and the I-93 bridge. It was observed on one occasion catching and eating a fish in the riffle area just downstream of the Tioga wetland.

The Loon Preservation Committee, a project of New Hampshire Audubon, is submitting a letter commenting on lake level management and the Common Loon. We endorse this statement.

In closing, we would like to reiterate our opposition to the channelization portion of this project. Lake level management alone should be tried prior to embarking on the costly channelization downstream. We appreciate this opportunity to comment and request the opportunity for additional comment if the project does proceed to the stage of detailed plans and specifications.

Sincerely,

A handwritten signature in black ink, reading "Leslie N. Corey, Jr." with a stylized flourish at the end.

Leslie N. Corey, Jr.  
Executive Director

LNC/jt

cc: Governor John Sununu  
New Hampshire Congressional Delegation  
Senator Gordon Humphrey  
Senator Warren Rudman  
Representative Judd Gregg  
Representative Robert Smith  
Delbert Downing, N.H. Water Resources Board



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

April 25, 1985

Planning Division  
Plan Formulation Branch

Mr. Leslie N. Corey, Jr.  
Executive Director  
Audubon Society of New Hampshire  
3 Silk Farm Road  
P.O. Box 528-B  
Concord, New Hampshire 03301

Dear Mr. Corey:

I am writing in response to your letter of February 13, 1985 in which you express several concerns regarding our investigation of flooding conditions within the Winnepesaukee River Basin.

On page 1 of your letter, you discuss the possibility of using wetlands for flood control storage and manipulation of streamflows into Lake Winnepesaukee as alternatives to proposed channel work. Wetlands retain floodwaters under existing conditions. Why alter these areas? Manipulation of streamflows into Lake Winnepesaukee would involve the construction of new dams which would be far more costly than the proposed channel work and would have their own adverse impacts.

We recognize the flood control potential of Lake Winnepesaukee. In fact, about 74 percent of the benefits that would result from our proposed project are realized through better use of the lake's existing flood storage capacity. Lowering the normal full pool elevation of Lake Winnepesaukee would provide even greater flood protection. However, the decision to lower the normal full pool elevation of the lake rests with the New Hampshire Water Resources Board (NHWRB) and the residents of the area. Lake level hearings have been held to discuss the management of Lake Winnepesaukee, but competing water resource interests within the basin have been unable to agree upon any change to the normal full pool elevation. In fact, many recreation and hydropower interests voiced strong opposition to any decrease in the normal full pool elevation of the lake (see letter from Mr. Delbert F. Downing, Chairman of the NHWRB, dated November 13, 1984). Fortunately, there are virtually no costs associated with lowering the normal full pool elevation of Lake Winnepesaukee and this alternative can be implemented at any time in the future without Federal assistance.

In the last paragraph of page 1, you indicate that a comprehensive lake level regulation scheme should be investigated as an alternative by itself prior to coupling it with downstream channelization. On pages 22 through 24 and in Table 9 of our report, lake regulation schemes are presented as

separate alternatives. If the State of New Hampshire and the local communities involved want to implement just the lake regulation changes, that is one of their options. We are required by regulations to identify the plan that maximizes net benefits, which was determined to be the combination of lake level regulations and channel modifications.

Your concerns regarding our findings of no significant environmental impacts are addressed in my response to the New Hampshire Fish and Game letter of February 25, 1985 (copy enclosed).

On page 2 of your letter, you express strong objection to a process which asks citizens to give final approval to a project requiring public money prior to the determination of the final cost. No one is being asked to give final approval or agree to spend any money at this time. What we are asking is whether or not the local sponsors, which are the State of New Hampshire and the affected communities, support the present findings of our study. If so, the report will be finalized and submitted to the Chief of Engineers requesting approval to begin preparation of plans and specifications. It is not until plans and specifications are substantially complete and we have a more accurate estimate of project costs, do we ask for a final commitment by the local sponsors. This process is used because the preparation of a final cost estimate requires detailed survey information, and before we can justify expending Federal funds to do these detailed surveys, we must first obtain initial support for the project.

In response to your other comments, discussion of endangered and threatened species will be added to the main report. Our discussion of the Bald Eagle will be expanded to include your comments and I have enclosed a copy of our response to concerns raised by Mr. Jeff Fair, Director of the Loon Preservation Committee, in his letter dated February 13, 1985.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8547. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

Sincerely,



Carl B. Sciple  
Colonel, Corps of Engineers  
Division Engineer

Enclosures

Tilton Conservation Commission  
Town of Tilton  
Tilton, New Hampshire 03276  
February 13, 1985

Mr. Dave Goodrich  
Army Corps of Engineers-NED  
NEDPL-PF, BLDG. 114-N  
424 Trapelo Road  
Waltham, Massachusetts 02254-9149

Dear Mr. Goodrich,

The Tilton Conservation Commission has reviewed, at length, the Environmental Assessment for the proposed Winnepesaukee River Basin Flood Control project. Commissioners have attended three local hearings on the project. We commented on the project earlier, September 10, 1984 (see Draft- Appendix A "Public Involvement" pages 15-19), expressing our concerns.

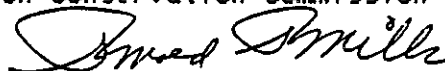
While some of our concerns were addressed, the majority of them were ignored. We found that the Environmental Assessment was without substance and included conflicting information.

Those of us who live in Tilton, in the downstream reaches of the project area, are all too aware of the adverse effects of improper lake level management. We feel that many of the problems downstream can be alleviated by improved lake level management. We urge that the alternative of modifying the spring fill up schedule be given the full and proper consideration it deserves in the Environmental Assessment Document. Not only are the benefits high (\$2,692,700) but the cost to the taxpayer is negligible. In addition, this alternative avoids channel modification and associated adverse impacts. We are also in favor of implementing a modified fall draw down schedule. While recreation interests on Lake Winnepesaukee may not agree, the safety and well-being of residents and resources downstream must be protected.

We are not in favor of the proposed channel modifications. We feel that this approach to solving flooding problems has adverse effects on fish habitat, wetlands (existing and associated), archeological resources, and aesthetics. Any loss in any of the previously-mentioned areas is simply not compensated by mitigation measures.

Sincerely,

The Tilton Conservation Commission



Ron Mills, Chairman  
Randy Ferrin  
Justine Gengras  
Robert Hardy  
Charles Mitchell

cc: N.H. Wetlands Board  
The Honorable Barbara Bowler, N.H. Representative  
The Honorable Kenneth Randall, N.H. Representative  
Raymond Burton, Executive Councilor



NEW HAMPSHIRE  
NATURAL HERITAGE  
PROGRAM

13 February 1985

Mr. David Goodrich  
U.S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254

Dear Mr. Goodrich;

RE: Proposed Winnepesaukee River Flood Control Project

The New Hampshire Natural Heritage Inventory operates through a cooperative agreement between and among The Nature Conservancy, Audubon Society of New Hampshire, Society for the Protection of New Hampshire Forests, New Hampshire Office of State Planning and New Hampshire Fish and Game Department. The New Hampshire Natural Heritage Inventory is an organized collection of data on the status and distribution of rare plant and animal species and exemplary natural communities.

Our comments on the project are as follows:

- 1) We are concerned about the effect of water level fluctuations on Common Loons. We therefore endorse the statement submitted by The Loon Preservation Committee, (a project of the Audubon Society of New Hampshire).
- 2) We are concerned about the possible environmental impact of downstream channelization and therefore support the statement submitted to you by the Audubon Society of New Hampshire.

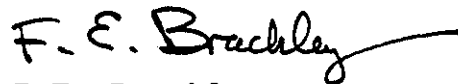
We would also like to make the following comments on the Draft Detailed Project Report/Environmental Assessment Study:

Under the heading of Endangered and Threatened Species, the discussion of the Bald Eagle should be expanded to address the possibility of reoccupation by this state endangered species.

The New Hampshire Natural Heritage Inventory maintains a list of plants considered rare for the state of New Hampshire. This list was based on the work by Storks and Crow (1978), and has been updated and refined to reflect subsequent field investigations. Until such time as the New Hampshire Endangered Species Conservation Act is expanded to include plants we would request that the Army Corps recognize the New Hampshire Natural Heritage Inventory's list. Two copies of the list in different formats are enclosed.

We appreciate the opportunity to comment on this project and request that the New Hampshire Natural Heritage Inventory be apprised of any future implementation of this project.

Sincerely,



F.E. Brackley  
Coordinator/Botanist

enclosure

cc. ASNH  
OSP  
NHF&G  
LPC



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

May 1, 1985

Planning Division  
Plan Formulation Branch

Mr. F. E. Brackley  
Coordinator/Botanist  
New Hampshire Natural Heritage Program  
54 Portsmouth Street  
Concord, New Hampshire 03301

Dear Mr. Brackley:

I am writing in response to your letter of February 13, 1985 in which you raise several concerns regarding the draft Winnepesaukee Detailed Project Report.

Your concerns regarding the effects of water level fluctuations on common loons are addressed in our response to Mr. Jeff Fair, Director of the Loon Preservation Committee (copy enclosed).

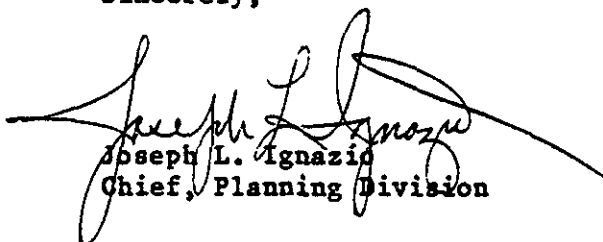
Similarly, your concerns regarding possible environmental impacts of downstream channelization are addressed in our response to Mr. Leslie N. Corey, Jr., Executive Director of the Audubon Society of New Hampshire (copy enclosed).

In regards to your other comments, discussion of the Bald Eagle and a list of rare plants will be added to the Environmental Assessment.

I hope my letter adequately addresses your concerns. Should you have further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

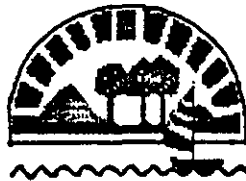
I thank you for your interest and cooperation during our study.

Sincerely,

  
Joseph L. Ignazio  
Chief, Planning Division

Enclosures





# Lake Winnepesaukee Association

13 February 1985

Mr. Dave Goodrich  
U.S. Army Corps of Engineers--NED  
NEDPL-PF, Building 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

Dear Mr. Goodrich:

This letter of comment pertains to the Local Flood Protection draft Detailed Project Report/ Environmental Assessment of the Winnepesaukee River Basin, N.H. We are disappointed in both the lack of vital information and the presence of misinformation in the report in its draft form, and hope these issues will be addressed in the final report. The Winnepesaukee watershed does have a flooding problem, and we hope that some form of participation by the Corps will help alleviate that problem.

The report as issued, however, starts from a questionable position. The Corps evidently has not studied the water balance and other factors related to the complex watershed system, including groundwater-surface water relationships, management alternatives, etc. Instead, the report is a plan for a dredging project of undetermined cost and many questionable "benefits". It is an Alice-in-Wonderland approach of verdict first, trial afterward; or an engineering equivalent to designing a car before checking on the clearance required to get over bumps in the road. Without a thorough examination of the causes of the problem, solutions can not be justified.

The report contains only four paragraphs considering climatology. Wouldn't it be wise to find out where and when the water enters the system before planning how it is released? The data considered in the report basically consider stream flows, dam operation, and precipitation in Lakeport and at nearby cities outside the watershed. This historical approach is interesting, but does not address the problems of different precipitation rates elsewhere in the watershed, particularly the Ossipee Mountains (Lakeport is one of the lowest, flattest, and therefore driest points), groundwater inflows through rock fractures (including those extending beyond the watershed as defined by surface topography), or the question of how changes in management not only of Lake Winnepesaukee but also its tributary lakes, rivers, and ponds might affect the system. For example, Lake Wentworth, Lake Waukegan, Lake Kanasatka, the Melvin River, the Red Hill River, Copp's Pond, and Lee's Pond are all dam controlled before emptying into Lake Winnepesaukee. Yet the report doesn't even mention these dams, and calls lowering the present "full" pool level of Lake Winnepesaukee "unacceptable" without providing any justification for that position. Since any cost-benefit analysis and environmental assessment should consider alternative solutions, the lack of any study of these alternatives is a fatal flaw. As you know, the \$5 million figure provided by the Corps as a cost estimate has caused considerable question as to how the local portion would be financed, particularly since it is not at all clear that the Corps' estimate is accurate since it is virtually unexplained in the report. The Corps has been working

on this study in one form or another for almost thirty years, and issued this DPR/EA three months later than promised in August. In that time, why haven't these questions been addressed? For that matter, why haven't the questions of others such as the Tilton Conservation Commission found in your "pertinent correspondence" section been answered?

Particularly aggravating is the absence of any reference to the most comprehensive study of the water balance of the lake, published in 1974 and entitled "Lake Winnepesaukee As A Quantitative Water Resource". This study took over 2000 man-hours and was done for the Lakes Region Planning Commission in Meredith (which published it) by Biospheric Consultants International of Laconia. No mention of it can be found in the draft under "prior reports" or anywhere else. This was not a part of the 208 Water Quality reports that are referenced.

The lack of a systems approach to the problem is even more evident from some of the report's own conclusions. In the supporting documentation, page 1-19, it says: "...for short duration high volume runoff events, increasing peak outflows from 2,600 to 4,000 cfs would have little effect on the resulting peak stage of the lake..." On page 1-22, it says: "Historically, flooding at Lake Winnepesaukee has occurred as a result of high volume rainfall and/or snowmelt runoff at times when the lake was initially or nearly full....Therefore, any improved lake regulating guidance or flood runoff forecasting procedure that would reduce the probability of premature filling of the lake should serve as a flood reducing measure for Lake Winnepesaukee." In other words, dredging won't help but forecasting and improved management will. Why, then, has the Corps ignored forecasting and limited its proposed management alternatives to "rule curves" that are straight lines disregarding any external variables that might be forecast?

There are a number of other omissions in the report, including data on lake water quality available from UNH; a recreational analysis of the river (particularly with regard to whitewater use that would be damaged by dredging); and an analysis of flood-causing storms by rainfall rather than runoff (the 1984 event may have been a 50-year event according to the gauge at Tilton, but daily rainfall didn't even qualify as a ten-year event). More disturbing is the sloppiness evident in the misinterpretation or lack of consideration of your own evidence.

For example, in letters in your "pertinent correspondence" from myself and from Jeff Fair, Director of the Loon Preservation Committee, it is noted that the loons make nests at a median height of five inches above the lake level at the time of nesting, and that "any water level increase after nest onset, then, will likely cause nest failure." (Fair letter). Yet your environmental assessment concludes (page 15): "The risk of any nests being flooded would be lessened." You propose, however, to increase water levels by six inches between May 10 and May 30th. With all your computers, presumably someone in the Corps can subtract 6 from 5 and determine that loon nests would be an inch under water on a calm day. If this simple math problem created difficulties, what confidence can anyone have in your damage assessments, cost-benefit ratios, cost estimates, etc.?

In addition, the Environmental Assessment concludes (EA 34): "There does (sic) not appear to be any major environmental problems, conflicts or disagreements that would result from construction activities. Implementation of the the proposed project will not have a significant impact on the human environment and, therefore, will not require an Environmental Impact Statement." Yet Gordon Beckett, Supervisor of the U.S. Fish and Wildlife Service in Concord, N.H., writes in his letter of January 27, 1983 that this letter "supersedes our letter of June 9,

1981" and that in several reaches of the river, dredging "could have a significant adverse impact" upon fishery resources "by reducing food and cover and changing flow characteristics and current velocities..." Yet page 7 of your 404 analysis states that: "The proposed discharge would not adversely affect organisms in the food web." These conclusions were not present in the 1981 letter, and the Corps has apparently ignored the later letter in favor of the earlier one. This type of selective use of your own information has the appearance of dishonesty.

The Corps evidently feels that any environmental damage can be resolved by the magic of "mitigation." Mitigation is equivalent to pouring water on a burning colonial house and then attempting to restore it. Somehow, it is never the same as the original. Fire prevention is far more effective. It is evident that a thorough Environmental Impact Statement is necessary to resolve both the question of the significance of various activities and the possible alternatives. The Corps has frequently lost in the past when it has been challenged in court relative to the need for an EIS, most notoriously with the Westway in New York City. Failure to follow the provisions of NEPA only causes delay, raises costs, and exacerbates problems. Why not do things right at the beginning, rather than continuing to be obstinate?

There are other misstatements in the report relative to a Lake Level Hearing held by the N.H. Water Resources Board concerning Lake Winnepesaukee. This hearing was called for (and paid for) by the Lake Winnepesaukee Association. On pages 22 and 23 of the main report, you state: "The purpose of the meeting was to discuss lowering the normal full pool elevation of Lake Winnepesaukee. During the meeting, recreation...interests voiced strong opposition to any decrease in the normal full pool of Lake Winnepesaukee." Both statements are wrong. Nowhere in the petition for the hearing (copy enclosed) was lowering full pool elevation mentioned. The only "recreation interest" to oppose a decrease was Scott Brackett of the Winnepesaukee Flagship Corporation, who is a member of our Board of Directors. He not only did not oppose any decrease (just a particular one of eight inches below present levels), but also made several suggestions concerning lake level management, including looking at alternate dates for reaching "full pool," and supported the recommendations of the Lake Winnepesaukee Association for a comprehensive lake level management policy. Many other interests, including a realtor, property owners, etc. testified that low water, while inconvenient, is far less damaging than high water. The N.H. Water Resources Board has been stating for over twenty years that "recreational interests" oppose lowering "full pool" level, yet I have been unable to determine from the Board or its files who these interests are. The Board was so anxious to overlook the Lake Winnepesaukee Association's request for a damage assessment of the 1984 flood and instead analyze the effects of lowering "full pool" that it acted on a letter from Andrew D'Angelo of Winnisquam to you (not the Board) dated several months before the hearing was called. Our final recommendations (copy enclosed) did not mention lowering "full pool." I suggest you carefully review these recommendations and the hearing record for a more accurate picture of the hearing, since the Board is depending heavily on your final conclusions in reaching its findings.

There is an unwritten element also lacking from the report--that of good faith or trustworthiness on the part of the Corps. New Hampshire is not noticeably hospitable to federal intervention. When the U.S. Coast Guard attempted to take over jurisdiction of Lake Winnepesaukee about a decade ago, it was met with strong opposition, and lost the war as a result of congressional action. The recent history of the Corps in having to plug canals it built in Florida, apply its own 404 regulations in Texas and develop numerous Environmental Impact Statements by court order, explain massive cost overruns on the Tennessee-Tombigbee Waterway, etc., do not create confidence. The Corps is very good at dredging, but in all too many

cases, such as the upper Mississippi River, the environmental results have been disastrous. In order for the people of New Hampshire to accept this project, the Corps will have to do a much better job than it has in the past of justifying its proposals. The draft report in this case is a long way from satisfactory.

What the Corps can do, in addition to correcting the draft and beginning the process of producing an Environmental Impact Statement, is to obtain more data on how the watershed functions. In line with the Lake Winnepesaukee Association recommendations to the N.H. Water Resources Board, you could develop a computerized model of Lake Winnepesaukee and its tributaries to be used in conjunction with existing models of the Merrimac River. The Corps has done this very successfully in the past, for example for some reservoirs in Texas as reported in the July 1984 issue of your publication "EWQOS--Environmental and Water Quality Operational Studies". Many other models are available, although most are for rivers, not lakes. Dr. Gordon Byers at the UNH Water Resources Research Center was able to access a multi-page listing of potential references from the Center's library through a computer keyword search, and I have no doubt that your own resources can produce far more. With the proper information available, a management plan for Lake Winnepesaukee and the Winnepesaukee River can be developed that may involve some dredging, some lake level height or timing changes, some enhanced climatological prediction, some mitigation, some public education, and other factors that will enable it to best meet the needs of the varied interests involved. We hope that you will assist in the preparation of such a plan, and look forward to your final Detailed Project Report.

Sincerely yours,

*Ralph Kirshner*

Ralph Kirshner, President



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

April 25, 1985

Planning Division  
Plan Formulation Branch

Mr. Ralph Kirshner, President  
Lake Winnepesaukee Association  
Star Route 62 Box 358  
Centre Harbor, New Hampshire 03226

Dear Mr. Kirshner:

I am writing in response to your letter of February 13, 1985, which contains questions and comments regarding our investigation of flooding conditions within the Winnepesaukee River Basin.

On the first page of your letter you question our analysis on the basis that we did not develop computer modeling, detailed climatology information and groundwater-surface water relationships or estimate groundwater inflows through rock fractures or different precipitation rates throughout the watershed. Watershed modeling in many cases is a useful tool, but is not as accurate in estimating existing flow characteristics as the analysis of historic streamflow gage records. Our analysis is based on the records of two streamflow gages, located along the Winnepesaukee River in Lakeport and Tilton, which have been in operation since June 1933 and January 1937, respectively. This historic data, when combined with our hydraulic computer model, provides an accurate assessment of the existing flood problem and the effectiveness of various alternatives.

In paragraph 3 of page 1, you state that we called lowering the normal full pool level of Lake Winnepesaukee an unacceptable solution without any justification. In a letter provided to us by Mr. Delbert F. Downing, Chairman of the New Hampshire Water Resources Board (NHWRB), dated November 13, 1984 (see Appendix A), he states, "Individuals' testimony at the October 12, 1984 hearing objected to the Board lowering the level of Lake Winnepesaukee as it would effect the tourist industry and hydro interests."

The report you refer to in paragraph 1 of page 2, entitled "Lake Winnepesaukee As A Quantitative Water Resource," deals primarily with the feasibility of diverting flows from Lake Winnepesaukee for the purpose of water supply. This concept has been investigated in several studies, two of which are referenced on page 3 of our Main Report.

On page 2, paragraph 2, you express the lack of a systems approach in our analysis. The plan we have identified is a systems solution to the flood problem. It combines added flood storage on Lake Winnepesaukee with increased carrying capacity along the Winnepesaukee River to provide flood prone structures within the basin with a high degree of protection. The alternative you discuss for forecasting flood events is currently practiced

by the NHWRB. However, their ability to draw down Lake Winnepesaukee quickly in anticipation of forecasted rainfall events is severely limited by the existing flow capacity of the Winnepesaukee River. This demonstrates the need to increase the carrying capacity of the Winnepesaukee River, which would provide the NHWRB with the ability to draw the lake down faster and to better regulate lake levels.

The "guide curves" do not disregard external variables as you've stated in paragraph 2 of page 2. The word "guide" indicates that these curves, or series of straight lines if you prefer, are not rigid but were developed to assist the NHWRB during the spring fill-up period. On page 34 of our Main Report, we state, "The guide curves, when tempered by the NHWRB's years of experience, can be used to obtain a gradual filling of the lake...." It is anticipated that the NHWRB would continue to consider variables, such as snow pack, weather forecasts, and antecedent ground conditions when regulating Lake Winnepesaukee and not blindly follow the "guide curves."

Your comments on page 2 in the last sentence of paragraph 3 and in paragraph 4 indicate that we have misinterpreted our information and that of others. The example you give regards Mr. Fair's letter of October 24, 1984 which states, "Minimum lake level variation between May 1 and July 15 is the primary concern for nesting loons. Under normal operating conditions, no lake level increase and draw downs of no more than one-foot cumulatively during this period are suggested as target goals." This statement can be interpreted a couple of ways and unfortunately did cause some confusion. Engineers of my staff met with Mr. Fair on March 5, 1985 to clarify the target goals and discuss the impacts of our proposed project on nesting loons. Modifications have been made to the spring fill-up schedule to better meet the needs of nesting loons. These changes have been coordinated with Mr. Fair.

In the last paragraph of page 2, you indicate that we have been selective in the presentation of comments from the U.S. Fish and Wildlife Service. The fact that both the January 27, 1983 and the June 9, 1981 U.S. Fish and Wildlife Service letters are contained in the Public Involvement Appendix is evidence that we have not been selective. All written comments from other Federal, State and local agencies as well as interested citizens and civic groups have been included in our report. The information contained in the Environmental Assessment represents the findings of our environmental staff and some findings do not necessarily agree with those of the U.S. Fish and Wildlife Service or other Federal, State and local agencies.

Your analogy, contained in paragraph 1 of page 3, of lighting a house on fire just to put it out and restore it, implies that the only reason we would perform channel modifications is to disturb the environment so that we could restore it afterwards. We have recommended channel modifications to increase the flow capacity of the Winnepesaukee River and substantially reduce the

risk and severity of future flood losses. Unfortunately, this work cannot be performed without some disturbance of environmental resources. The mitigation measures we have proposed, many of which were developed through coordination with the U.S. Fish and Wildlife Service and N.H. Fish and Game Department, are not "magic," but carefully thought out and proven measures to reduce adverse environmental impacts. Approximately one third of the total project first cost is obligated to mitigation measures.

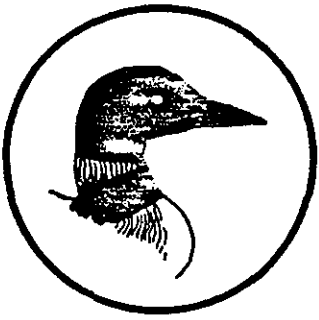
In paragraph 2 of page 3, you indicate that we have misstated the purpose and results of the October 22, 1984 lake level hearing conducted by the NHWRB. The purpose of lowering the normal full pool elevation may not have been stated in the Lake Winnepesaukee Association's petition, but was the primary topic of discussion. In regards to our interpretation of the results of that meeting, I again refer you to Mr. Downing's letter of November 13, 1984.

In paragraph 3 of page 3, you mention Federal intervention. The Corps was requested by the State of New Hampshire to study the flooding problem within the basin. If the State disagrees with our findings, they are under no obligation to continue with the study. Only with their support can the project be constructed.

I hope my letter adequately addresses your concerns. Should you have any further questions please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

Sincerely,

Joseph L. Ignazio  
Chief, Planning Division



# The Loon Preservation Committee

Main Street, Humiston Building • Meredith, New Hampshire 03253

Telephone (603) 279-5000

An Audubon Society of New Hampshire Project

13 February 1985

Sue Brown  
Impact Analysis Bureau  
U.S. Army Corps of Engineers  
Building 113N 424 Trapelo Road  
Waltham, MA 02245

Dear Sue:

This letter is my comment on the Army Corps of Engineers draft Project Report/Environmental Assessment for the Winnepesaukee River Basin, entitled "Local Flood Protection," and dated November 1984. I'm going to keep this as brief as possible; you know I'm always available for further information.

First, in reference to your telephone call after the hearing in the Lakes Region on the 21st of last month, my letter of October 24, 1984 (included in Appendix A of the document in question) states that target goals for lake level management should include no lake level increase, and draw-dawn of no more than one foot in total during the period between May 1 and July 15 which is the normal average loon nesting period. I believe there was some discussion at that hearing about whether I indicated that a one-foot lake level change was acceptable. I repeat that a one-foot increase in lake level is very likely to do damage to the common loon productivity on the lake.

I also stated in my letter that "any water level increase greater than 0.5 feet is likely to flood nests and cause significant loss of productivity." In his letter of October 3, 1984 (also on Loon Preservation Committee letterhead) my associate Ralph Kirshner provided the Corps with some specific data showing that loon nests were constructed an average of 5.5 inches above water level. This agrees with and supports my generalization above. On any lake with nesting loons, six inches of water level increase is likely to significantly reduce loon nesting success. Six inches. Lake Winnepesaukee is especially critical since about 15% of all loon productivity in New Hampshire has come from this lake in recent years.

Now Sue, according to the Corps' Lake Filling Guide Curve (Figure 3), if the lake is more than 0.3 feet below target full pool on May 1, we can expect a rate of filling (increase in lake level) of more than six inches in thirty days. From lower



levels, rates of lake level increase would be even higher. Further, Figure 4, "Lake Level Regulation," indicates that the Corps' proposed lake level increase in May (an average rate, I assume) would occur at a much faster rate than the ten year average, and that the lake level would increase approximately 0.7 feet during May under the proposed scheme, where it increased only 0.2 feet in the same period on the ten year average. (Remember that May is the primary month for nest initiation by common loons.)

On page EA-15 of the document in question, however, the authors call this proposed filling rate "gradual" and state that it "would provide more favorable shoreline conditions for nesting waterfowl, particularly those areas used by the common loon..." "The risk of any nests being flooded," it goes on to say, "would be lessened."

Sue, this just isn't so.

The proposed water level changes during the prime loon nesting onset period are highly likely to do the exact opposite of what the report states on page EA-15--they are likely to have a negative effect on shoreline nesting populations. For loons, this effect would be virtually impossible to mitigate.

The common loon (Gavia immer) is a State Threatened Species, and it deserves a closer look in the Corps' environmental assessment efforts involved with this project. Its needs in the draft report were apparently not considered closely enough. As always, I am available to provide further ecological information and to help the Corps consider the project's effects on the nesting and productivity of this important and legislatively protected species.

Most respectfully submitted,

Jeff Fair, Director

cc: Dave Goodrich, USACE ✓  
NH Water Resources Board  
ASNH  
LWA  
USFWS-Gordon Russell  
NHF&G-Howard Nowell  
Senators Rudman and Humphrey  
Congressmen Gregg and Smith



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

April 25, 1985

Planning Division  
Plan Formulation Branch

Mr. Jeff Fair, Director  
The Loon Preservation Committee  
Main Street, Humiston Building  
Meredith, New Hampshire 03253

Dear Mr. Fair:

I am writing in response to your letter of February 13, 1985 regarding the effects of the proposed spring fill-up schedule of Lake Winnepesaukee on the common loon (Gavia immer). Ms. Sue Brown and Mr. Dave Goodrich of my staff met with you on March 5, 1985 to discuss your concerns.

Loons normally nest during May. Rises in lake levels of 6 inches or more during this time are detrimental to nesting loons regardless of the antecedent lake level. The average yearly rise in lake levels during May over a 10-year period (1973-1982) has been about 4 inches, reaching slightly over full pool, which is 504.3 feet NGVD, by June 1. Using the guide curves the proposed rise in lake levels during May would be about 6 to 7 inches, reaching full pool by June 1. This rise is greater than the current average and as indicated in your letter, may be detrimental to nesting loons. In an effort to develop a more acceptable compromise among competing water resource interests in the basin, engineers of my staff investigated some additional spring fill-up schedules.

The guide curves could not be modified making May 1 the target full pool date, without forfeiting much of their potential flood control value. One alternative would be to use the guide curves as developed until the start of the nesting season and then maintain that as the target lake level for the remainder of May. This would minimize the impact of lake level rises on nesting loons and maintain the full flood control value of the guide curves, at the possible expense of not meeting the June 1 target full pool level.

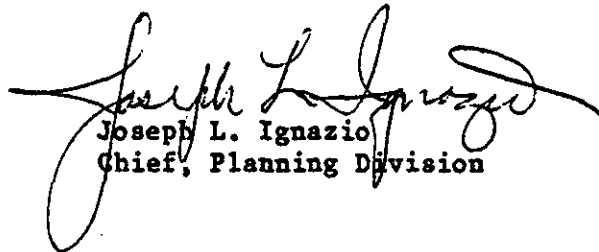
Another alternative would be to alter the guide curves to reflect the differences in average monthly inflow during March, April and May. A modified guide curve is attached for your information. This refinement would reduce the proposed rise in lake levels during May to between 3 and 4 inches, while still reaching the target full pool level by June 1. This would reduce the adverse impact of lake level rises on nesting loons and maintain the full pool target level, at the possible expense of some flood storage capacity.

Considering the importance of a full pool to the recreation industry, the modified guide curves appear to be the most acceptable compromise among competing water resource interests in the basin and will be incorporated into our final report as part of the recommended plan.

In conclusion, there is no one plan of operation of this huge water resource that will meet the entire needs of all. There is also no one plan that would be optimum under all hydrologic conditions. The optimum plan is something that the NHWRB should continue to strive for based on all hydrologic information available and by the continual coordination with and appraisal of all of the various water resource needs in the basin.

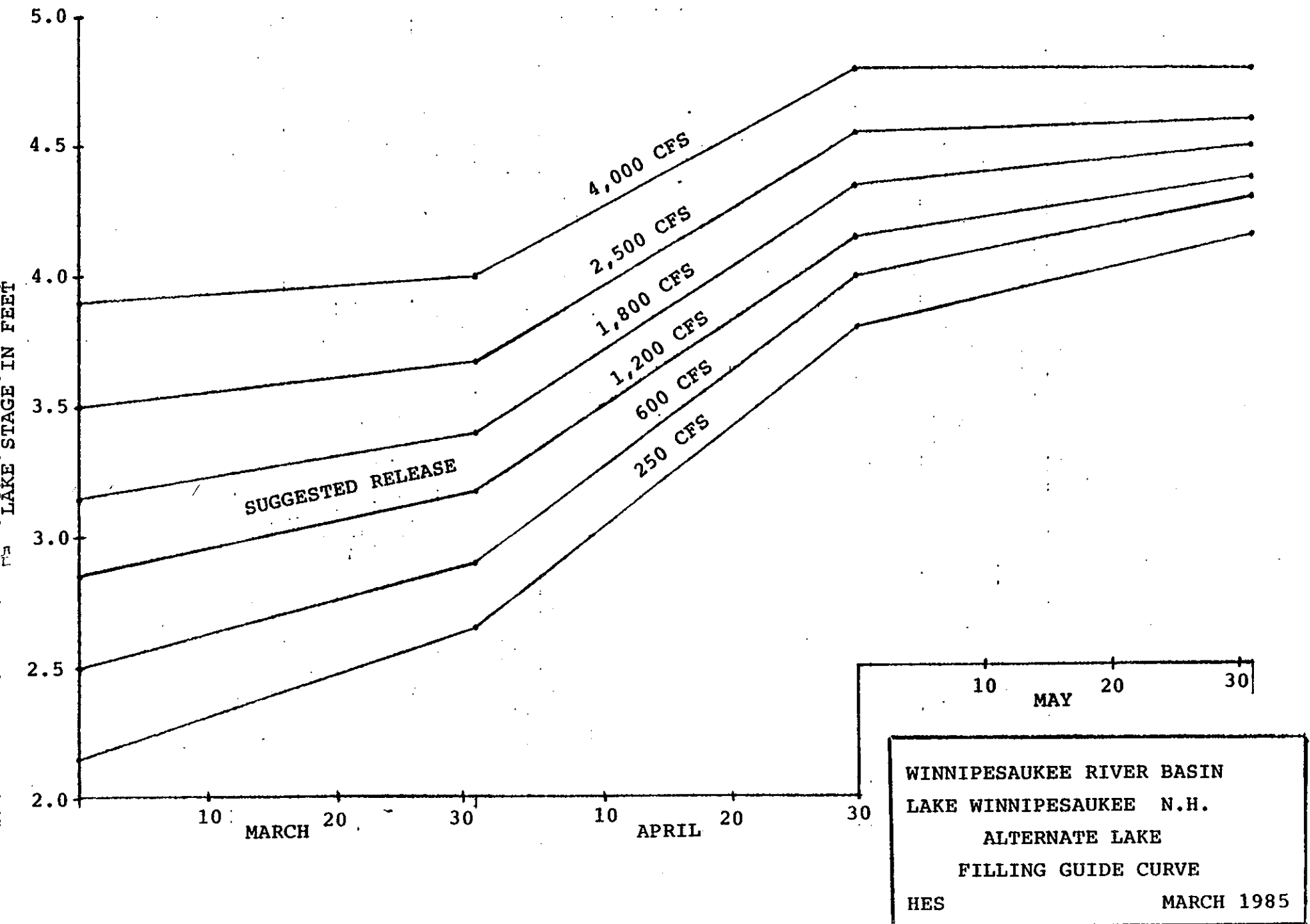
I thank you for your interest and cooperation during our study, and I look forward to your continued involvement.

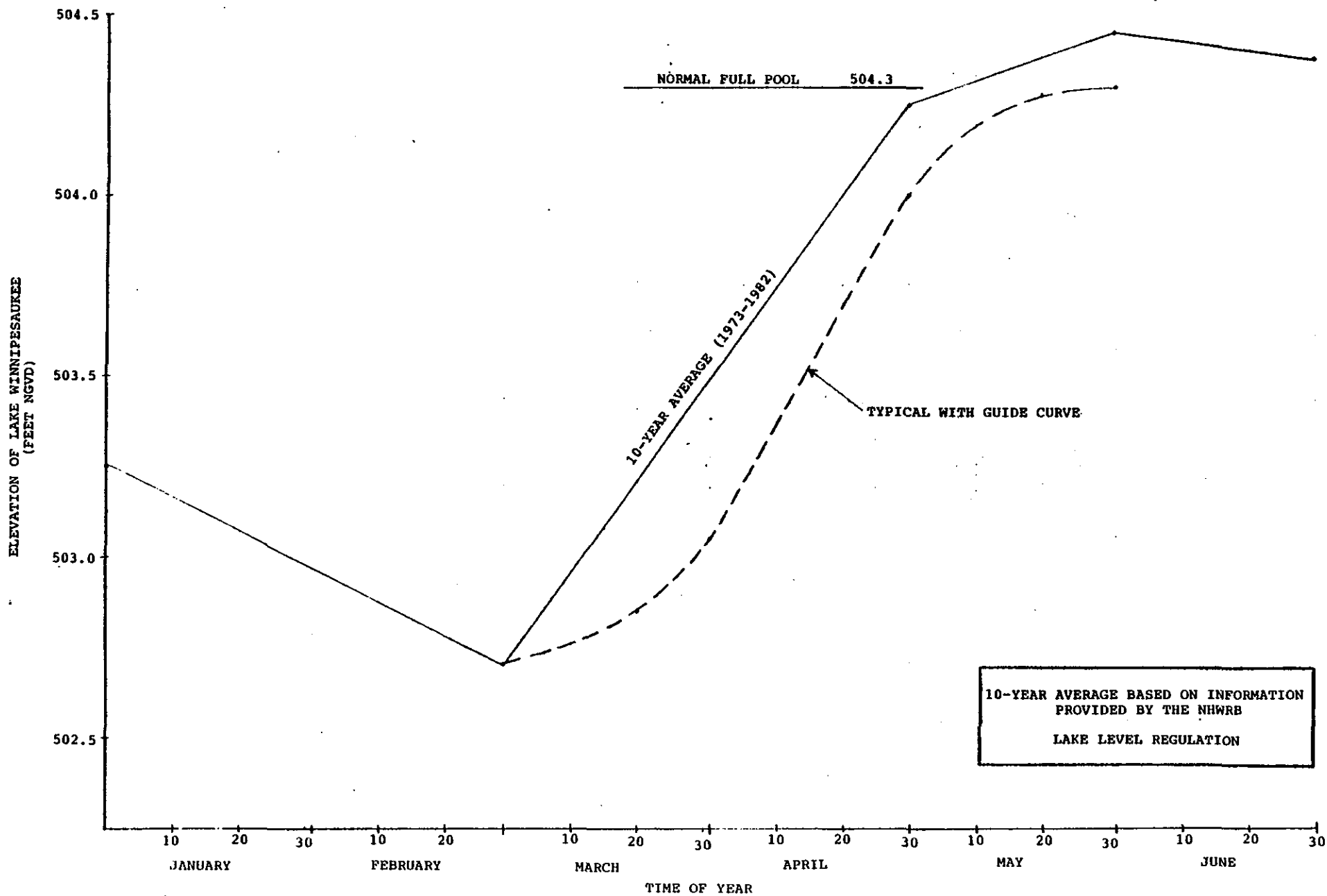
Sincerely,



Joseph L. Ignazio  
Chief, Planning Division

Enclosures





STATE OF NEW HAMPSHIRE



FISH AND GAME DEPARTMENT

CHARLES E. BARRY  
EXECUTIVE DIRECTOR

Box 2003  
34 Bridge Street  
Concord, N. H. 03301  
(603) 271-3421

February 11, 1985

Ms. Susan E. Brown  
U. S. Army Corps of Engineers, NED  
NEDPC-I, Building 113-N  
424 Trapelo Road  
Waltham, Massachusetts 02254-9149

Re: Detailed Project Report/Environmental Assessment  
Winnepesaukee River Basin, New Hampshire  
November 1984 (Draft)

Dear Ms. Brown:

Written comments and the willingness of the State and local communities are expected in your office February 14, 1985. As a result of our meeting with you and Dave Goodrich last Thursday you are aware of problems perceived by the Fish and Game Department.

I respectfully ask for a two-week extension of time so that our current position regarding the effects of dredging can be reviewed with our staff as well as other State agencies.

Sincerely yours,

*Charles E. Barry*  
Charles E. Barry  
Executive Director

CEB:emb  
cc: Stephen A. Virgin, P.E.  
William C. Ingham, Jr.



# Merrimack River Watershed Council

February 8, 1985

Mr. Dave Goodrich  
U.S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

Dear Sir:

The Merrimack River Watershed Council promotes the wise use and management of our watershed's many streams and rivers and their floodplains. On that basis, we are submitting the following comments on the proposed Winnepesaukee River Project's environmental assessment.

We support the proposed modification of Lake Winnepesaukee's spring fill-up and fall draw-down schedules, in the belief that this change will alleviate part of the problem at little cost and will lessen the demand to make major modifications to the river below.

We can also support some of the proposed modifications to existing man-made obstructions on the Winnepesaukee River. Specifically, we would support the proposed changes to the following obstructions and potential obstructions:

- the J.P. Stevens Company dam in Franklin,
- the state-owned railroad bridge, downstream of Park Street in Tilton/Northfield,
- the Tilton dam (if not already removed),
- the Gold Street trestle bridge in Lakeport, and
- the U.S.G.S. weir in Lakeport.

Further, we do not oppose the removal of sediment from beneath the Daniell bridge in Franklin, nor from beneath and immediately upstream of the Main Street bridge in Laconia, in order to protect these major transportation structures, since the flow projections indicate that both become river obstructions at high flow times.

However, we would oppose the wholesale dredging of large sections of the natural streambottom of the Winnepesaukee River in order to artificially increase its capacity. The value of shallow, fast-flowing water and riffles to stocked and native fish and to river oxygen levels, we believe, is particularly important in such locations as:

- downtown Tilton ("Damage Reach 2"),
- the vicinity of Rt. 140 ("Damage Reach 3A"), and
- downtown Laconia, below the Avery dam (minor changes to protect the Main Street bridge may be necessary here as noted above) ("Damage Reach 4").

We also believe that the following questions about other aspects of this proposed project need to be addressed:

1. Would the proposed changes we have supported above reduce the number of

694 Main Street, West Newbury, Mass. 01985 (617) 363-5777

New Hampshire Office — 54 Portsmouth Street, Concord, N.H. 03301 (603) 224-8322

potential flood prone days and therefore reduce the justification for major river modifications?

2. Would the removal of accumulated sediments above the Avery and Lakeport dams be permanent? If not, has the cost of future dredging been figured into the equation which compares the proposed project with such alternatives as floodproofing?

3. If a channel is dredged on only one side of such islands as Eagar Island, will they not cease to be islands?

4. Why is five feet of dredging above the Avery and Lakeport dams necessary to pass 1 1/2 feet of water at these locations?

5. What effect will the operation of the proposed bottom-hinged dam have on the ecologically important regular flooding of Tioga Swamp? What about its effect on boating in the river here from the public boat ramp immediately downstream of the proposed damsite(not shown on your maps)?

6. Have the economics of the sport fishing in the areas to be dredged been figured into the negative side of the cost/benefit analysis of the proposed dredging?

This project should not be presented as an all or nothing proposal, but rather as a series of suggested actions, each with a summary of its need, effects and impacts, so that the merits of each can be weighed.

We believe that in weighing these other important questions should also be addressed by New Hampshire citizens:

To what extent should major, costly, and environmentally detrimental modifications to our rivers be made so that those who have built floodprone structures on land known to flood can experience no inconvenience or economic loss from their decision? Should the public's state and federal tax money be used to subsidize this poor planning? Should the owners of older stream-side structures which have survived past flooding also expect the public to pay for major engineering projects because they are unwilling to accept the floodprone nature of their structures and/or are unwilling to purchase flood insurance to protect themselves from flood losses?

Where flood damage can be prevented by better management of our rivers and lakes as they presently exist-such as through revised lake level schedules and better operation of dams - it should be done. If, in addition, the general (non-riverfront/non-lakefront) public is willing to assist riverfront/lakefront landowners with public tax money, then rather than dredge the river, we would like to propose instead a 50-50 cost-sharing, floodproofing program (not the full-cost, full floodproofing alternative used in the environmental assessment's comparison of alternatives).

The savings from such a cost-sharing program may increase the likelihood of state funding of the program.

Sincerely yours,  
*Nathan Tufts, Jr.*  
Nathan Tufts, Jr.  
President

cc: N.H. Fish & Game





DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

May 21, 1985

Planning Division  
Plan Formulation Branch

Mr. Nathan Tufts, Jr., President  
Merrimack River Watershed Council  
54 Portsmouth Street  
Concord, New Hampshire 03301

Dear Mr. Tufts:

I am writing in response to your letter of February 8, 1985 in which you ask several questions regarding our investigation of flooding conditions within the Winnepesaukee River Basin. Our responses to your questions are as follows:

1. Construction of the channel modifications you support would reduce flooding in the immediate area of this work. However, these modifications alone would do nothing to help flooding conditions on Lake Winnepesaukee, which is where the majority of flood losses have occurred in the past. Unless all of the proposed modifications are made, the New Hampshire Water Resources Board (NHWRB) cannot release greater discharges from Lakeport Dam without worsening downstream flooding.
2. These areas above Avery and Lakeport Dams would require periodic dredging to remove any newly collected sediments and debris that infringe upon the flow capacity of the river. The cost of future dredging has been included in the annual cost of the project.
3. Eager Island would remain an island. Water levels around Eager Island are controlled by the level of Winnisquam Lake, which is located just downstream of Eager Island and has a normal full pool elevation of 482.0 feet NGVD<sup>1</sup>. The depth of water on the side of Eager Island to be dredged would be deeper after the work is completed. The normal full pool elevation of Winnisquam Lake will be added to Plate 10 of our final report to illustrate this point.
4. Five feet of dredging is required above Avery and Lakeport Dams to provide the area necessary to pass the design flow without causing flooding. The area required is a function of both depth and width of the river. Because the plan does not propose to widen the river the area increase must be made up by deepening the river section. As shown on Plates 10 and 12 of the draft report, the dredging removes high points in the riverbed to provide a smooth gradient with upstream and downstream reaches.

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<sup>1</sup> NGVD (National Geodetic Vertical Datum) is defined as the mean sea level of 1929.

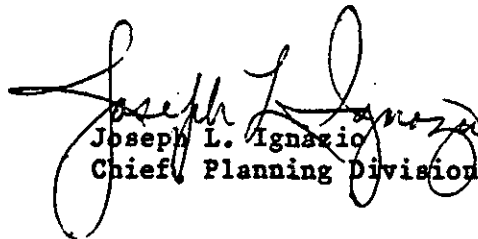
5. The proposed bottom-hinged gate was designed to duplicate existing water level conditions in Silver Lake and Tioga Wetland. It will not prevent periodic flooding of Tioga Wetland, merely reduce the extent of flooding as shown on Plate 1-16, Index Station No. 3A. If required, a new boat ramp can be constructed just upstream of the proposed dam site as part of our project.

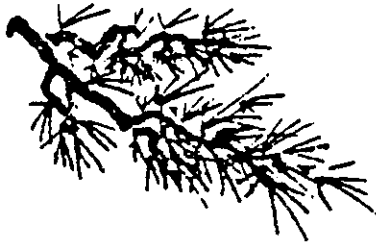
6. Although recreation, hydropower, and environmental impacts are considered in our evaluation of each alternative, the sole purpose of the proposed project is flood control. Therefore, only flood control costs, including mitigation measures, and benefits were evaluated in our analysis.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

I thank you for your interest in our study and I look forward to your continued involvement.

Sincerely,

  
Joseph L. Ignazio  
Chief, Planning Division



NEW HAMPSHIRE ASSOCIATION OF CONSERVATION COMMISSIONS  
54 PORTSMOUTH STREET, CONCORD, NH 03301 224-7867

February 7, 1985

Chairman Delbert Downing  
NH Water Resources Board  
37 Pleasant Street  
Concord, NH 03301

Dear Chairman Downing:

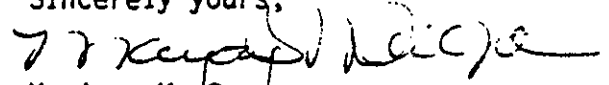
Although I was unable to attend the January 21, 1985 meeting in Tilton, I have read the draft project report and environmental impact assessment prepared by the US Army Corps of Engineers for the Winnepesaukee River Basin Local Flood Protection Project.

I was interested that the fourth paragraph on page EA 13 of the environmental impact assessment section describes the importance of the Tioga wetland as habitat for fish and waterfowl and that paragraph 3 on page EA 20 states: "In order to determine impacts on the Tioga Wetland associated with the proposed work in the river, it was assumed that water level conditions in the wetland would be similar to those in Silver Lake." (emphasis added). I also noted that letters from the New Hampshire Department of Fish and Game and the US Fish and Wildlife Service included in Appendix A expressed concern four years ago about the effect of the project on the Tioga Wetland.

The fact that the Corps of Engineers has chosen to address this concern by making an assumption rather than by collecting data reinforces the opinion that I offered to the Corps in August of 1984: Begin by implementing the proposed changes in the regulation of the water level of Lake Winnepesaukee and collect data on the conditions produced by the modification (including the water levels in the Tioga Wetland!). Then evaluate the need for the extensive and expensive dredging project.

Thank you for considering these views.

Sincerely yours,

  
Marjory M. Swope  
Executive Director

MMS/m

cc: Ms. Susan E. Brown, COE - NED

February 1, 1985

RECEIVED

N. H. Water Resources Board  
37 Pleasant Street  
Concord, N. H. 03301

Re: Flood Control Project - Winnepesaukee Lake  
Silver Lake Area

Gentlemen:

I wish to be recorded in support of the proposed flood control plan which has been introduced by the U.S. Corps of Engineers and the New Hampshire Water Resources Board. I was unable to attend the recent meeting, but I would like to add my name to those supporting this worthwhile and direly-needed project.

I lease property at Silver Lake which I try to use from May through October every year. This property abuts property lived in year-round by my uncle, Fred Mahoney of Lochmere. Due to extremely high water caused by excessive rain this last spring, it was impossible for me to even get on the land, let alone try to use the buildings on this site. The water level was so high and did not recede until July, that it was impossible for me to use my property until almost August. The water reached both buildings on this property and many items in the buildings were destroyed because they sat in water for several months before I could even try to retrieve them.

As a relative and neighbor of Mr. Mahoney, I can attest to the fact that this problem existed very severely for him, causing water in his cellar for an extensive period of time. His house sits at least 300 feet from the average level water line of Silver Lake. A picnic table that was about 80 feet from shore floated away, the dock was ruined, it was impossible for him to have any kind of garden because his back yard was under water for such an extended length of time, and leach-field problems arose because of this high level of flooding.

While my problem is one of recreational use, I do pay taxes to the town of Tilton for this land, I completely sympathize with property owners around the lake who make this area their year-round abode. I feel that improvements and safe-guards against future flooding problems are long overdue.

I completely support the project.

Sincerely,

*Ann P. Cailler*  
Ann P. Cailler



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION I**

**J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203**

January 31, 1985

Ms. Susan E. Brown  
U.S. Army Corps of Engineers - NED  
NEDPL-I, Bldg. 113-N  
424 Trapelo Road  
Waltham, MA 02254-9149

RE: Winnipiesaukee River Basin

Dear Ms. Brown:

We have reviewed the Draft Winnipiesaukee Detailed Project Report, the Draft Environmental Assessment/Environmental Finding of No Significant Impact and Section 404(b)(1) Evaluation for the Winnipiesaukee River Basin Local Flood Protection Project in Belknap, Carroll, Grafton, Merrimack, and Strafford Counties, New Hampshire.

The proposed plan has been found to be satisfactory from the standpoint of environmental quality health and welfare, within EPA's areas of jurisdiction and expertise.

Please send us two copies of the Final Winnipiesaukee Detailed Project Report, Environmental Assessment/Environmental Finding of No Significant Impact and Section 404(b)(1) Evaluation.

Sincerely yours,

A handwritten signature in cursive script, reading "Elizabeth A. Higgins", is written over the typed name.

Elizabeth A. Higgins, Assistant Director  
for Environmental Review  
Office of Government Relations  
& Environmental Review (RGR)

cc: Paul E. Pronovost, Acting Chief  
Planning Division, COE-Waltham



# State of New Hampshire

HOUSE OF REPRESENTATIVES

CONCORD

January 29, 1985

Mr. Dave Goodrich  
U.S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, Massachusetts 02254-9149

RE: Flood-Control Proposal in the  
Winnepesaukee River Basin

Dear Mr. Goodrich:

At this time, the only action aimed at improved flood control that I can support is the modified fill-up and draw-down schedule. It does seem strange, as pointed out at the last informational meeting in Tilton, that this option was not presented as an alternative on its own.

Implementing the modified fill-up and draw-down schedule for a few years has a lot of positive benefits. They include:

No cost. A prudent approach when millions of tax-dollars spent are a certainty with other options.

The natural environment would not be threatened by irreversible actions. Our natural environment is the basis for New Hampshire's envied quality of life. Recreational, commercial, and residential interests would not be served by undermining that base.

The cost/benefit ratio would be indisputably positive. I take strong exception to the cost/benefit ratios developed by the Corps for the recommended plan. It may be persuasive in Washington, but it makes little sense on site.

Avoidance of underestimated costs. It is very probable that the cost of archaeological work and proper handling and disposal of asbestos-contaminated dredged material would far exceed the Corps's estimates (and would be a charge to non-federal sources).

Preservation of the riverbed archaeological mill district in Reach 3B. This National Register Archaeological District is so unique and valuable that it must be preserved whatever course is taken.

All these benefits can be realized by implementing the modified fill-up and draw-down schedules, while retaining the various options if necessary for the future.

Finally, a hard look should be given to the "need" of the recommended project. Flood events have occurred over long intervals, may be man-made to some degree, and impact those who choose to occupy flood-plain areas.

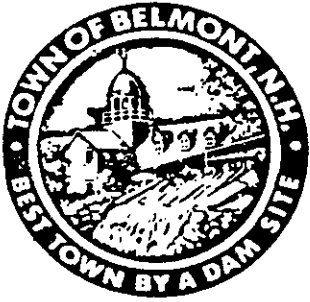
Before a large commitment of tax money is made, the no-cost option should be given a fair trial.

Sincerely,



Barbara B. Bowler  
State Representative  
Belknap District 2

BBB/ep



## TOWN OF BELMONT, NEW HAMPSHIRE

OFFICE OF:

SELECTMEN

January 21, 1985

Telephone: 267-8145  
267-6986

Mr. Dave Goodrich  
U.S. Army Corps of Engineers - NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

RE: Winnepeasukee Flood Control Program

Dear Mr. Goodrich:

The Board of Selectmen recently reviewed the draft report on correcting flood problems in the Winnepesaukee River Basin Area. The Board has discussed the matter in detail, and the members have unanimously voted to oppose the project as presently planned.

Two major concerns about the project have led the Selectmen to their decision. First, there still seems to be debate concerning the impact to delicate environmental areas in the Basin. Of primary concern is the area directly downstream from Silver Lake. There still remains considerable debate about the initial damage to the area, and whether the affected areas will "regenerate" themselves.

A second concern deals with the financial participation of the "non-federal share". There is a great reluctance on everyone's part to discuss this issue. Before a project of this magnitude can even be considered, all associated costs and financing mechanisms should be thoroughly evaluated to insure that all costs are equitably distributed to the benefitting parties. The Selectmen are of the opinion that a primary supporter of this movement is the recreational interests, and this group should be assigned some financial responsibility of this project.

In closing, the Board of Selectmen feel that the stated benefits of the project are intangible at best, and remaining environmental and financial questions must be addressed before the project is allowed to continue.

Sincerely,

David R. Caron  
Administrator





DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

May 14, 1985

Planning Division  
Plan Formulation Branch

Mr. David R. Caron, Administrator  
Town of Belmont  
P.O. Box 67  
Belmont, New Hampshire 03220-0067

Dear Mr. Caron:

I am writing in response to your letter of January 21, 1985 in which you raise two major concerns regarding our investigation of flooding conditions within the Winnepesaukee River Basin.

Your first concern regarding the environmental impacts of proposed channel modifications and whether or not affected areas will regenerate themselves is addressed in our response to the New Hampshire Fish and Game letter of February 25, 1985 (copy enclosed).

Your second concern deals with the non-Federal share of project costs, which is currently estimated at \$1.3 million. The State of New Hampshire has appropriated \$400,000 to repair the railroad bridge in Tilton. A bill to appropriate the remaining \$900,000 has been deferred until a final project cost estimate has been prepared.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

I thank you for your interest and cooperation during our study, and I look forward to your continued involvement.

Sincerely,

Joseph L. Ignazio  
Chief, Planning Division

**ARWOOD CORP.**

Subsidiary of

**Interlake, Inc.**

Granite Street  
Tilton, New Hampshire 03276  
603-286-4301

**RECEIVED**

January 21, 1985

JAN 21 1985

**NEW HAMPSHIRE  
WATER RESOURCES BOARD**

N.H. Water Resources Board  
37 Pleasant Street  
Concord, N.H. 03301

Gentlemen:

In regard to the proposed dredging of the Winnepesaukee River, Arwood is very much in favor of the intent of this project; however, we do have a few concerns about preserving an ample supply of clean river water during this project. Our main concern, obviously, is having an uninterrupted supply of river water. The second concern, and of equal importance, is the amount of silt and fines that will be stirred up during the dredging operation.

Arwood draws approximately 100,000 g.p.d. from the river. Of this, about 50,000 g.p.d. is used for cooling and about 50,000 g.p.d. is used for process. Of the process water about 47,000 g.p.d. is used for high pressure washing of castings and dust collection, and about 3,000 g.p.d. is used in the making of molds.

The high pressure pumps have closely machined parts in the water end and require clean water to function. The cooling water valves and heat exchangers can also be adversely affected by dirt in the river water. Additionally, our mold quality will be lowered if foreign material is introduced into the molds.

Our most recent analysis of the river water shows a PH of 7.15 and a TSS of 2.5 mg./l. Our wash pumps have the following particle size requirements: Partek Pumps - 10 micron; Woma Pumps - 7 micron; and John Bean Pumps - particle free.

If we can be guaranteed no interruption in water supply and a minimal increase in the amount of TSS, Arwood would highly endorse this project and have all our cooperation.

*P.S. - 4' x 4' INTAKE  
Filter House to  
be considered in project.  
D.P.E.*

Sincerely yours,

ARWOOD CORPORATION

*Douglas P. Ellis*

Douglas P. Ellis  
Plant Engineer

DPE:ct

Janaury 7, 19854

Ms. Susan E. Brown  
U.S. Army Corps of Engineers  
New England District  
NEDPL-I, Building 113-N  
424 Trapelo Road  
Waltham, MA 02254-9149

RE: Winnepesaukee River Flood Protection Proposal

Dear Ms. Brown:

I completely disagree with your "Finding of No Significant Impact" on the above referenced study. The portion of the proposed action that I am most familiar with is the channelization of the river principally in reach 3A but elsewhere as well. I shall confine most of my comments to that area rather than the lake level modification.

Generically, I oppose such pork-barrel boondoggle proposals such as this COE proposal. Why should my tax dollars subsidize individuals and firms building on flood prone areas? Why continue to modify relatively-intact ecosystems, especially aquatic systems, when there are fewer and fewer of them accessible to us? I think your Draft Report really fails to address what people want from their government. People generally want a high quality natural environment and they want their bureaucrats to efficiently serve them rather than creating additional make-work facilities that will require man-hours and budgets indefinitely.


Wetlands, we are taught, absorb excess water and store it; they slow runoff and provide diverse habitat for fish and wildlife; further their biological processes tend to cleanse nutrients and impurities from the water. Wetlands are generally accorded great value in environmental planning. Many statutes on the local, state and federal level are designed to protect, even enhance aquatic systems. Section 404 of the Clean Water Act charges the Corps of Engineers with protecting the natural waters of the nation. Your role as environmental guardian has put you in a unique position in this case...to evaluate your own actions. I think that were you to seriously look at the dredging and damming aspects of the proposed action that you would not find "No Significant Impact".

I would like to share a few specific comments on the Draft. They follow:

- . From Plate 6-3 of Appendix 6 it appears that no sediment samples were taken immediately downstream of the now-capped solid waste dump immediately on the bend opposite and downstream of Tioga Creek. I believe asbestos products are burried at this site. Though above the high water line, I would be curious to know if any of this material has migrated into the Winnepesaukee River. Your report ignores this potential.
- . I believe your summary of events in the Public Coordination Section (Page 47) misleads the reader. All but a single individual present at the August 22, 1984 meeting spoke in vehement opposition to the proposal. In the vernacular, it appears that you "glossed over" the strong verbal attacks that you took all evening.
- . Your conclusion in Table 12 on Page 43 of no loss of wildlife habitat is remarkable. Did you see the same river, especially between Silver Lake and the proposed bascule gate that I know? If the removal of that area's riverine wetlands is not wildlife habitat, indeed excellent wildlife habitat then I am neither a responsible Certified Wildlife Biologist or Certified Environmental Planner. Were I, a private developer, seeking to effect the same changes in fish and wildlife habitat, I would be laughed out of the regulatory agency offices, including your own, with a conclusion of "no loss of wildlife habitat".
- . No mention of lost hunting, as recreation, is made on Page 43 of the same Table 12. Page EA-8 continues this ommission. Were all the many sportsmen who use that area to know of your plans I am sure you would be made abundantly aware of their concerns over the loss of their prime waterfowl hunting area.
- . Your contention that hunting and fishing access, canoeing and the general enjoyment of the natural environment would be improved by deeping the channel (Page 42) is predicated on the assumption that grounding a canoe or boat on an occassional sand bar is somehow undesirable. Part of the desireability of the canoeing and boating in the area proposed for dredging in reach 3A is the fine clear sand. The water is clean enough to swim in and the sand is not littered with discarded man-made objects. There is habitat immediately adjacent the main river channel which provides excellent non-consumptive and consumptive recreational uses of the area. Deepening the channel, lining the banks with Class A rip rap, and periodic re-dredging will wrench this area's natural charm and attractiveness from the very people who enjoy it. The area will be less "natural" after your proposed action than before.
- . There is an assertion on Page 42 that the proposed draw-down and fill-up schedule "will provide more stable shoreline habitat for waterfowl" on Lake Winnepesaukee. The authors fail to prove that the current rates and times of release and impoundment of Lake Winnepesaukee have created any problems for nesting, resting, or migrating waterfowl. Your report implies a benefit, yet no facts are provided.

In conclusion, I object to your gross underestimation of the ecological losses particularly in reach 3A. Furthermore, your underlying assumption that somehow the people of New Hampshire want you to continue modifying streams which are, for the large part, free-flowing defies reality. You are wrong, we do not want further flood control activities on the Winnepesaukee River. Study the fill up and drawdown procedures of Lakeport Dam and the other dams on the river but please leave the natural river bed alone.

Very truly yours,

A handwritten signature in cursive script, reading "Peter W. Spear".

Peter W. Spear  
Certified Wildlife Biologist (TWS)  
Certified Environmental Planner (NAEP)

PWS/lr



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

May 21, 1985

Planning Division  
Plan Formulation Branch

Mr. Peter W. Spear  
167 South Street  
Concord, New Hampshire 03301

Dear Mr. Spear:

I am writing in response to your letter of January 7, 1985 in which you express several comments regarding our investigation of flooding conditions within the Winnepesaukee River Basin. Ms. Sue Brown and Mr. Dave Goodrich of my staff met with you on March 26, 1985 to discuss your concerns.

In your first comment, you indicate that no sediment samples were taken immediately downstream of the now-capped solid waste dump that is located on the bend opposite and just downstream of Tioga River. As shown on Plate 6-3 of our report, two samples were taken in this area. Asbestos levels at these sites were found to be less than detectable (see Appendix 6 of our report).

You state in your second comment that our summary of the August 22, 1984 Public Meeting is misleading. It is recorded in the stenographer's report that 21 people opted to comment at the August meeting. Five, not one, spoke out in support of the proposed project. Five, including yourself, voiced strong opposition to the proposed project based on adverse environmental impacts. Other speakers at the meeting questioned various aspects of the proposed project, such as the benefit-to-cost ratio and local cost sharing requirements, but did not directly express support or opposition to the project. The paragraph on Page 47 of our report, which discusses the results of the August meeting as documented in the stenographer's report, expresses a more accurate account of the meeting than your summary.

Your third and fourth comments concern the loss of wildlife habitat and prime hunting areas in Tioga Wetland. As discussed with you at the March meeting, all proposed dredging in the reach above Route 140 would be performed along the natural channel of the river. Although there would be a deeper channel in this area after dredging, shallow shoreline habitat will still be present. There would be no loss of waterfowl habitat or prime hunting areas.

Your fifth comment questions our findings that channel excavation would improve canoe access to hunting and fishing areas along Reach 3A. You state that our findings are based upon the assumption that grounding a canoe or boat on an occasional sand bar is somehow undesirable. Our findings are based on a general knowledge of canoeing and statements made at the August 22, 1984 Public Meeting. All of the Silver Lake residents who spoke at the August meeting explained how undesirable and frustrating it is to ground canoes and boats.

You also mention in your fifth comment that we would be lining the streambanks with riprap. The only areas to be riprapped, except two, are at existing highway bridges. The two exceptions are in Tilton, where local officials have requested that riprap be placed along the northerly end of Tilton Island to prevent further erosion; and in Laconia, where riprap would be placed along the northerly streambank behind two residential homes across from Eager Island. These areas do not provide valuable wildlife habitat.

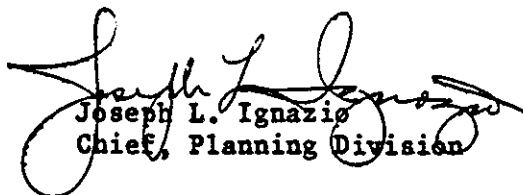
Your final concern regarding the effects of the proposed draw-down and fill-up schedule on waterfowl habitat is addressed in our response to Mr. Jeff Fair's, Director of the Loon Preservation Committee, letter of April 25, 1985 (copy enclosed).

In conclusion, we were requested by the State of New Hampshire to investigate flooding conditions within the Winnepesaukee River Basin and to develop a plan that would reduce annual flood losses. We are not assuming that the people of New Hampshire want to implement the plan we have developed. If we had, there would have been no reason to hold a public meeting or release a draft report for public review. We do not make the final decision on whether or not to build this project. The decision to go forward is made by the people of New Hampshire through their elected and appointed officials.

I hope my letter adequately addresses your concerns. Should you have any further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich has coordinated this investigation and can be reached at (617) 647-8547.

I thank you for your interest in our study and I look forward to your continued involvement.

Sincerely,

  
Joseph L. Ignazio  
Chief, Planning Division

Enclosure

75 Pine Street  
Laconia, N.H.  
03246  
January 2, 1984

Division Engineer  
U. S. Army Corps Of Engineers  
New England Division  
424 Trapelo Road  
Waltham, MA. 02154

Dear Sir:

This is concerning the Winnepesaukee River Basin Study. First , my knowledge is very limited about these matters but I still would like to voice my opinion . I own a Summer place on Silver Lake and the flooding and the rise and fall of the water level is quite a costly problem. Some Summers we are unable to enjoy our camp until after the fourth of July... This last Summer (1984) we had to replace our water pump and our hot water tank because the water came up as it had never had before. Of course the sand that we buy for the beach , is a small matter, but it is costly year after year. There's usually damage to the dock if we put it up before the fourth of July .. So you see we get very little time at camp where we can rely on the shore line staying in one place...

I understand that there's two solutions to this-- the one that you people advocate is a complicated engineer process that depends on the votes in Congress and on the money to do all this. In the shape that our country is in I can not see that Congress will vote the moneys for this project. When will we benefit from this -- in ten years or so. In the meantime I'm paying for flood damages every year and have very little time at my Summer camp , when the shore line stays the same...



The other solution, if I understand correctly, is to lower the Big Lake 12 to 14 inches permanently. This would be a little costly to some property owners on the Big Lake and some business establishments but, to me, it's more practical and the expense is shared by many people, instead of the whole country.... Also, this simple solution, could be implemented soon, so that we can start enjoying our summer property before the fourth of July. And I'm sure that the poor little ducks would also appreciate not having their humble little nests destroyed every Spring. To me the ecology is very important. The poor loons are almost extinct thanks to us. Let's try this simple, fairly inexpensive solution, without the help of politicians. The cost will be shared by property owners just like the cost of flooding on Silver Lake has been shared by property owners there for many years.

I'm sure that the U.S. Army of Engineers certainly must have some expertise that could help us in this matter, and the simple solution is worth a trial..

You probably think that I'm simple minded to suggest such a thing to a highly technical and efficient department as U.S. Army Corps of Engineers but, as a tax payer, I feel that I'm entitled to voice my opinion.

Looking forward to your reply (unless you decide to round file my letter) and hoping that you will clarify this whole thing in a satisfactory way. Thank you for your time as, I'm sure that you are very busy..

*P.S. Please don't  
send me your large  
packet of information  
as I can not  
digest it! I rely  
on your judgement.*

Yours truly, .

*Marguerite Samson*

Marguerite Samson, a tax payer  
75 Pine Street  
Laconia, N.H.

03246



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

January 25, 1985

REPLY TO  
ATTENTION OF

Planning Division  
Plan Formulation Branch

Ms. Marquerite Samson  
75 Pine Street  
Laconia, New Hampshire 03246

Dear Ms. Samson:

I am writing in response to your letter of January 2, 1985 in which you expressed two concerns, flooding in the Silver Lake area and the fluctuation of lake levels.

Our investigation has determined that flooding in the Silver Lake area is caused primarily by the channel just downstream of the lake which has become restricted by an accumulation of sand and debris and can no longer pass flood flows. Lowering Lake Winnepesaukee 12 to 14 inches will allow the New Hampshire Water Resources Board (NHWRB) to store excess flood waters in the lake and to limit their discharges from Lakeport Dam. This will help to reduce flood losses in the Silver Lake area. However, even with this additional storage in Lake Winnepesaukee, discharges from Lakeport Dam would still range from 2,000 to 2,600 cubic feet per second during periods of flooding. These flows have caused serious flood losses in the Silver Lake area in the past. With the plan we have identified, the accumulation of sand and debris downstream of Silver Lake would be removed to allow greater flows and reduce flood losses in this area. In addition, our proposed changes to the regulation of water levels in Lake Winnepesaukee, which involve a more gradual spring fill-up and earlier fall draw-down, would provide a significant amount of flood storage for excess flood waters without adversely impacting recreation, hydropower, or environmental resources in the basin. It is estimated that with strong public support our plan of channel improvements can be constructed within 2 years.

Water levels on Silver Lake vary because there is no control structure, such as a dam, located downstream of the lake. Until there is, water levels in Silver Lake will continue to fluctuate. Lowering Lake Winnepesaukee will do little to help this situation. The plan we have identified involves the construction of a small dam downstream of Silver Lake to stabilize water levels. Before this dam is constructed a "lake level hearing" will be held by the NHWRB with the residents of the area to determine the most acceptable level to maintain the lake.

Lowering Lake Winnepesaukee 12 to 14 inches appears to be simple and very inexpensive plan. However, if Lake Winnepesaukee is lowered many of the marinas on the lake which have the minimum clearance for boats would require dredging, thousands of docks would have to be lowered, hydropower interests would suffer reduced generating capacity and lake trout spawning areas would

be adversely affected. The cost to dredge marinas and lower docks along with the annual loss of hydropower would far exceed the cost of the plan we have identified. This does not include the economic impact lowering the lake would have on the recreation industry in the region which would be enormous.

I hope my letter adequately addresses your concerns. Should you have any further questions please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

Sincerely,



Joseph L. Ignazio  
Chief, Planning Division



**CITY OF LACONIA, NEW HAMPSHIRE** 03246-3472

*"City on the Lakes"*

**OFFICE OF: PUBLIC WORKS DEPARTMENT**

December 31, 1984

Mr. David Goodrich  
U.S. Army C of E, NED  
NEDPL - PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

Dear Mr. Goodrich:

I have completed my review of the November 1984 draft of the Winnepesaukee Detailed Project Report. At the moment, I do not have any comments but I do have some questions that I would like answered, whether or not I will then have comments will depend upon said answers.

I refer you to reach #4, plates 2-6, and 3-9 as well as pages 3-5 and 3-6 of the supporting documentation. It is noted that consideration has been given to pier foundation protection for the Church Street bridge foundation. This is a relatively new bridge, thus, "As Built" information is readily available. However, little attention seems to have been given to center pier foundation of the Main Street Bridge other than a notation that the location will have "Class I Stone Protection". In that said pier was installed in about 1921, there is little information available relative to footing details for the pier. From what little information that I can gather, the 3 foot dredge could well leave the pier footing exposed. I thus feel that a detailed investigation and protective engineering design is in order. In addition, caisson installation and difficult, and thus expensive, footing modification may well need to be accomplished. In that the cost estimate does not give a detailed breakdown, I would like to know if these two costs have been included, and if so, at what figure.

What is the estimate that is being used for modification to the inverted syphons at the Church Street and Main Street Bridges and what is the proposed solution?

Reference is made to plate 2-6. In the vicinity<sup>of</sup> station 830+00 and buildings #58 and #59 are two additional inverted sewer siphons. There is also a good possibility that there is a 16 inch force main within the reach. None of these are shown on the plate, perhaps for good reason. Have they been considered and is the cost of protection included in the estimate? If so, what does it amount to?

Has any consideration been given to the dredging of that stretch of river from about 820+50 to 820+00? This area has a significant delta along both banks with only the center channel free of build up.

I look forward with interest to the above.

Very truly yours,

  
\_\_\_\_\_  
Frank R. DeNormandie  
PUBLIC WORKS DIRECTOR

FRD:f



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

January 25, 1985

REPLY TO  
ATTENTION OF

Planning Division  
Plan Formulation Branch

Mr. Frank R. DeNormandie  
Director of Public Works  
City Hall  
Laconia, New Hampshire 03246-3472

Dear Mr. DeNormandie:

I am writing in response to your letter of December 31, 1984 regarding your review of the draft Winnepesaukee Detailed Project Report.

We are in the planning stages of our investigation of the Winnepesaukee River Basin. The concerns you've raised are very specific and cannot be answered until more detailed surveys have been performed.

Based on available information, we feel stone slope protection will be adequate to protect the pier footings of the Main Street Bridge. However, we share your concern, and during the preparation of plans and specifications a core or testpit will be taken adjacent to the footings of the Main Street Bridge to determine their bottom elevation and if additional protection is required.

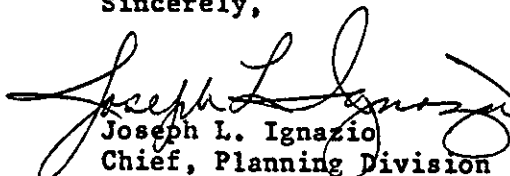
The elevation and location of most utilities are still uncertain at this time. We have contacted engineers from each of the communities involved, including yourself, to obtain this information. However, not all of this information was readily available. During the preparation of plans and specifications the location and elevation of each utility crossing will have to be obtained to determine which utilities require relocation and the best way to perform the work. In our draft report a lump sum value of \$150,000 was used as an estimate for utility relocations.

Based on the most recent stream profiles of the Winnepesaukee River, which were taken by Anderson Nichols in 1978, the area between stations 820+50 and 820+00 does not require dredging. However, detailed surveys will be performed during the preparation of plans and specifications, which will determine if stream profiles have changed significantly since 1978 and whether or not this area requires dredging.

I hope this letter adequately addresses your concerns. Should you have further questions, please contact me at (617) 647-8508. Mr. Dave Goodrich of my staff has coordinated this investigation and can be reached at (617) 647-8547.

I thank you for your interest and cooperation during our study.

Sincerely,

  
Joseph L. Ignazio  
Chief, Planning Division

ROBERT H. ROWE  
ATTORNEY AT LAW  
4 LIMBO LANE  
P.O. BOX 537  
AMHERST, NEW HAMPSHIRE 03031-0537  
(603) 673-4543

December 3, 1984

UNITED STATES CORPS OF ENGINEERS  
424 Traplo Road  
Waltham, Massachusetts 02154

RE: WINNIPESAUKEE RIVER, TILTON/NORTHDAL, NEW HAMPSHIRE

Gentlemen:

I represent a corporation known as Winnepisseoge Power Corporation, located in Tilton, New Hampshire. Winnepisseoge Power Corporation has a dam site located on the river and has filed a preliminary permit application with the Federal Energy Regulatory Commission. Since the filing, it has come to my attention that a group of individuals known as White Oak Hydroelectric Association, through an Irv Tolles, is in the process of filing for a license at a site up river of my client's dam location. This license application will conflict with the deeded water rights of my client and will adversely affect its hydroelectric site.

The major concern which I have is that according to the enclosed letter from Mr. Tolles the Corps of Engineers is financing the private venture. Since this will cause our project to be economically unfeasible, I would like to express my concern as to the public funding of a private project such as that of Mr. Tolles.

I am further surprised in that there has been no contact from Mr. Tolles or the Corps of Engineers while this project was in the preliminary planning stage so the parties could meet and possibly resolve the dispute to allow the economic feasibility of each hydroelectric site.

Other than the attached letter, I have no further information from Mr. Tolles, and I would appreciate receiving any documentation or correspondence which you may have relating to this matter.

Very truly yours,

  
Robert H. Rowe

RHR/eiw  
Enclosure  
cc: Mr. Turchin

DEC 7 1984



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02254

REPLY TO  
ATTENTION OF

January 28, 1984

Planning Division  
Plan Formulation Branch

Mr. Robert H. Rowe  
Attorney at Law  
4 Limbo Lane  
P.O. Box 537  
Amherst, New Hampshire 03031-0537

Dear Mr. Rowe:

This is in response to your letter of December 3, 1984 regarding correspondence you received from Mr. Tolles in which he discusses Federal financing of a private hydropower venture along the Winnepesaukee River. Unfortunately, a copy of Mr. Tolles' letter was not enclosed with your correspondence, as stated, so I cannot respond to any comments made by Mr. Tolles.

At the request of the State of New Hampshire, we have developed a plan of channel modifications along the Winnepesaukee River to reduce the risk of future flood losses within the basin. Our proposed channel modifications include deepening the river channel downstream of Silver Lake and Tioga Wetland to allow greater flows through this reach. Because deepening the channel in this area would lower water levels in Silver Lake and Tioga Wetland during periods of low flow, our proposal includes the construction of a 4-foot high bottom-hinged gate just downstream of Route 140. This structure is designed to stabilize water levels in Silver Lake and Tioga Wetland and pass flood flows.

Following our August 22, 1984 public meeting in Laconia, New Hampshire, Mr. Tolles mentioned to Mr. Goodrich of my staff that he was investigating the feasibility of constructing a hydropower site downstream of our proposed dam location. Mr. Tolles questioned that if his dam was designed to eliminate the need for our bottom-hinged gate would Federal funding be available to assist him. Mr. Goodrich explained that the Corps of Engineers cannot provide financial assistance for the construction of a private hydropower facility and suggested that he present his proposal to the New Hampshire Water Resources Board (NHWRB). The Corps of Engineers can only assist qualified local or State government sponsors. Agreements with private individuals must be made through the official sponsor. This is the last we have heard on Mr. Tolles' proposal. We have not received any documentation or correspondence relating to this matter.

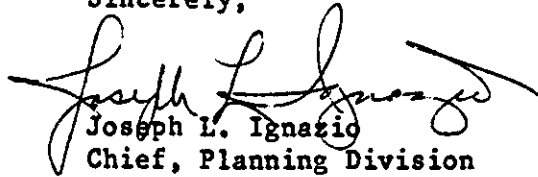
If you have any further questions concerning Mr. Tolles' proposal, I suggest you contact Mr. Delbert Downing, Chairman of the NHWRB, 37 Pleasant Street, Concord, New Hampshire 03301.



The Winnepisseoge Power Corporation is on our mailing list and was sent a notice of our August 22, 1984 public meeting and a draft copy of the Winnepesaukee River Basin Report. We will continue to keep your client informed as our study progresses.

Should you have any questions concerning our study of the Winnepesaukee River Basin, please contact me at (617) 647-8508. Mr. Dave Goodrich is coordinating this investigation and can be reached at (617) 647-8547.

Sincerely,



Joseph L. Ignazio  
Chief, Planning Division



# State of New Hampshire

## WATER RESOURCES BOARD

37 Pleasant Street  
Concord, N.H. 03301  
TELEPHONE 271-3406



November 13, 1984

Col. Carl B. Sciple  
U. S. Army Corps of Engineers  
NEDPL-PF. Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

Dear Col. Sciple:

This letter is to inform the U. S. Corps of Engineers of our position regarding your proposed project to alleviate the flooding along the Winnepesaukee River from Laconia to Franklin, New Hampshire.

The Board and your technical staff has had several discussions and meetings with local and state officials to explain in detail the impacts on the environment and fiscal issues raised at the first public meeting. The hydraulic restrictions in each damage reach was reviewed in detail together with the proposed modifications to increase flows from the Lakeort Dam from 2600 to 4000 cfs and maintain a river profile below the present 2600 cfs profile. We also are evaluating data and testimony presented at a lake level hearing conducted by the Board on October 12, 1984.

Testimony and correspondence related to your project indicate maintaining lower lake levels in the spring will solve many of the flooding problems along the Winnepesaukee River. Individuals testimony at the October 12, 1984, hearing objected to the Board lowering the level of Lake Winnepesaukee as it would effect the tourist industry and hydro interests.

After reviewing your proposal its our position that channel improvements are necessary for regulating flood fows from our structure along the Winnepesaukee River and reduce present flood related damages. This is a long range solution to the present flooding problems that have plagued the Board for many years. It is also our position that a fragmented approach to specific improvements in one or two areas will not be in the best interest of the state and would not solve our problem of restricting discharge at Lake Winnepesaukee to reduce downstream damages.

Sincerely yours,

*Delbert F. Downing*  
Delbert F. Downing  
Chairman

DMR/bhl



JOHN H. SUNUNU  
Governor

**STATE OF NEW HAMPSHIRE  
EXECUTIVE DEPARTMENT**

New Hampshire Civil Defense Agency  
State Office Park South  
107 Pleasant Street  
Concord, New Hampshire 03301  
603/271-2231  
1-800-852-3792



RICHARD H. STROME  
Director

JAMES A. SAGGIOTES  
Deputy Director

November 7, 1984

**RECEIVED**

NOV 13 1984

**NEW HAMPSHIRE  
WATER RESOURCES BOARD**

Mr. Delbert F. Downing, Chairman  
Water Resources Board  
37 Pleasant Street  
Concord, N.H. 03301

Dear Mr. Downing:

Reference your letter of 24 October 1984 concerning the Corps of Engineers' Winnepesaukee River Project, the New Hampshire Civil Defense Agency supports those riverine projects which increase the carrying capacity of the stream bed without adversely affecting areas downstream of the project or impacting upon environmentally sensitive areas. This proposed project seems to satisfy these criteria.

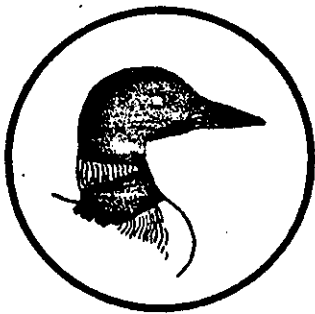
Past experience of flooding on the Winnepesaukee River has shown that total damage figures can be extensive. However, historically those structures not covered by flood insurance have not been affected to the extent that disaster assistance becomes available. Thus, the owners must bear the cost of repair. By reducing the flood hazard, this project would be economically beneficial to those people with homes and businesses along the river.

If this agency can further assist the Water Resources Board, please let us know.

Sincerely,

Richard H. Strome  
Director

DNC/RHS/jmb  
0613B



# The Loon Preservation Committee

Main Street, Humiston Building • Meredith, New Hampshire 03253

Telephone (603) 279-5000

An Audubon Society of New Hampshire Project

October 24, 1984

## COMMENTS ON LAKE LEVEL MANAGEMENT OF LAKE WINNIPESAUKEE

### AND SUGGESTIONS FOR A FUTURE MANAGEMENT SCHEME

TO

New Hampshire Water Resources Board  
and U.S. Army Corps of Engineers, New England Div.

The Loon Preservation Committee (LPC) of the Audubon Society of New Hampshire has recorded common loon (Gavia immer) productivity on Lake Winnepesaukee since 1974. Since that time, full-time summer staff biologists have been stationed there for this purpose.

In recent years, Winnepesaukee's lake level management has posed no major threat to the nesting ecology of the common loon, a threatened species in New Hampshire. A small number of nests have failed due to water level increases in May, June, and July, but lake level management has for the most part provided for a fairly stable water level during the nesting period.

In light of a recent U.S. Army Corps of Engineers proposal and public reactions to that and to the effects of spring '84 flooding on the lake, the Loon Preservation Committee of the Audubon Society of New Hampshire is offering here its comments which should help in the formation of potential new lake level management schemes.

### EFFECTS OF WATER LEVEL FLUCTUATIONS ON COMMON LOONS

Primary water level factors influencing common loon nesting success are increases in water level after nests are laid, and the timing and rate of draw-down.

For loons, which must nest near shorelines due to morphological adaptations which cause a pronounced lack of ability to negotiate on land, the steadier the water level, the better. In general, any water level increase greater than 0.5 feet is likely to flood nests and cause significant loss of productivity through cooling eggs or washing them out. Loons appear able in some cases to build the nest up during slow water level increases, but in most cases this does not occur or suffice, and nests are lost. Any water level increase after nest onset, then, will likely cause nest failure.

Water level recession is more difficult to qualify, in part, due to the following variables: conformation (percent slope and presence of obstacles) of shoreline exposed, individual loons' behavioral differences, and the development of stronger nest attachment by adults during the four-week incubation. Where a one foot drop in water levels may open one hundred feet of marshy bottom between a nest and the new shoreline for one pair, the same drop may open merely two feet of sandy beach in front of another nest. The loons' trail between water and nest may constitute another attractant for shoreline predators.

Some birds are likely to abandon their nest as soon as any additional "walking" is required between water and nest, while others have been known to cross up to 80 feet of exposed and irregular shoreline to continue incubation. The latter case is unique; distances of over ten feet are likely to be tolerated during the third or fourth weeks of incubation, since nesting attachment has increased by then.

Lake Umbagog, our most productive lake, suffered the failure of all nests (approximately 15 loon pairs nest on Umbagog) due to lake level fluctuations in 1978. On many New Hampshire lakes and ponds, water level changes constitute a primary cause of nest failure or egg loss.

In general, water level recession will have a lesser negative effect if it is slow or if it occurs later during incubation.

It should be noted that early nest failure--generally occurring within the first two weeks of incubation--may be followed by another nesting attempt by the same pair. Renesting, however, is not guaranteed and is therefore not reason enough to discontinue water level management precautions for nesting loons. Nests lost after the second week of incubation are not likely to be replaced.

#### ADDITIONAL CONSIDERATIONS

Extreme high water on Winnepesaukee--levels as far above full pond as exhibited during the spring of 1984--covers traditional nest sites, and renders much of the shoreline too irregular (due to shrubs growing above the normal water line, windthrows and driftwood right at the new water line) and therefore unapproachable for loons.

Low water may also uncover hazards below regular shoreline but not likely of the magnitude of flooding.

The primary long range consideration for loon productivity is fisheries. A variety of fisheries are found in Winnepesaukee and should be sustained for the health of lake ecology and as forage for several species of predators including loons. To this end, spawning areas and submergent vegetative cover must be protected from water levels in either extreme as well--so not to render the spawning beds

too shallow or allow too great a depth over the pondweeds for them to reach surface to flower. Tertiary factors related to overall lake ecological health include the maintenance of shoreline vegetation and mast production for other species including waterfowl and mammals. The Water Resources Board, in conjunction with local planning and "watchdog" organizations should study the many various ecological effects of long and short term water level changes.

#### A NOTE ON THE USE OF ARTIFICIAL NESTING ISLANDS

Artificial nesting islands, or "rafts", although successful as a specific management tool when applied properly and in areas in which their use is feasible, are not a final salvation for loons. The rafts are effective where water level fluctuation is a problem only when (a) the loon territory involved has within it a spot where the raft can be floated out of human traffic and winds, and (b) the loon pair accepts the raft as an alternate nesting site (not all do). An experienced biologist should be involved in raft employment.

#### MANAGEMENT GUIDELINES - A TARGET SCHEME

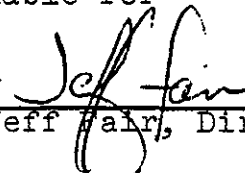
Minimum lake level variation between May 1 and July 15 is the primary concern for nesting loons.

Under normal operating conditions, no lake level increase and draw downs of no more than one foot cumulatively during this period are suggested as target goals. The later the draw down, the less likely it would have an effect upon nesting success.

Actual water level is of less importance, though reference is made to this subject above. The Loon Preservation Committee hopes that the New Hampshire Water Resources Board and the U.S. Army Corps of Engineers will duly investigate all environmental concerns including fishery spawning areas and lake acidity in relation to flooding and low water before the agencies formulate and adopt any flood control projects or lake management schemes. (For example, it appears that the Corps' current proposal would increase the rate of water-level increase in May, which could prove significantly detrimental to the loons' nesting success.)

The Loon Preservation Committee is readily available for further comment and assistance.

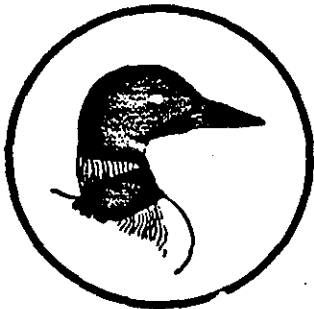
COMMENT SUBMITTED BY

  
Jeff Fair, Director

Date \_\_\_\_\_

cc: WRB members  
ASNH  
LWA  
USFWS-Gordon Russell  
NHF&G-Howard Nowell

amh



# The Loon Preservation Committee

Main Street, Humiston Building • Meredith, New Hampshire 03253

Telephone (603) 279-5000

An Audubon Society of New Hampshire Project

October 3, 1984

Sue Brown  
Impact Analysis Bureau, U.S.A.C.E.  
Building 113N 424 Trapelo Road  
Waltham, MA 02254

Dear Ms. Brown:

I apologize for taking so long to get back to you concerning loon nesting on Lake Winnepesaukee in relation to the USACE proposed Winnepesaukee River Basin flood control project. After several visits to the N.H. water resources board for lake level information, and various nest measurements, I have some data that shows how sensitive loon nests are to small fluctuations of the lake level. While we have a few birds nesting on artificial floating islands, most nests are in areas where these are not suitable or usable, and are on natural islands close to the shore, since loons have poor mobility on land. The nests measured had floor levels from 3 inches to 5 1/2 inches above the arbitrary "full lake" level (established by the Lakeport dam owners in the eighteen hundreds) of 504.32 feet. The lake often rises above this level in the Spring due to the water resource board's policies of trying to maintain the lake at full pool to aid navigation, with little flood storage capacity. This past Spring flooding was unusually severe, with the lake reaching 505.89'. Two nests established after the peak of this flooding were 16 1/2" and 18" above "full lake" but still below flood level highs.

Our experience has been that loons can tolerate water level decreases, within limits, better than increases. They will negotiate difficult terrain to reach a nest where incubation has been taking place for about a week or more; nests in the early stages of incubation or perched on steep slopes, etc. are often abandoned if water levels drop. We have had loons continue incubation on lakes in northern N.H. where nests have been left over ten feet above water and over one hundred feet inland; only in rare instances, however, can loon nests tolerate flooding, and then only when the birds raise the floor level by no more than a few inches. Loons are opportunistic in their choice of nesting material, often using nothing more than a scrape on the ground surrounded by a few leaves or whatever is at hand (at least, actually) dragged in by the birds often after incubation has started, possibly as a result of boredom. These poorly constructed nests are very vulnerable to wave action at water levels higher than those at the time of construction; in fact, some are vulnerable in any case. I have seen loons sitting on a fresh egg on a scrape on a beach a few inches from the water on a calm morning washed off their nest when the wind picked up in the afternoon. The eggs could not be moved—birds are attached to the nest, not the egg, and prefer to sit on an empty nest with the egg in plain sight a foot away. Sixty million years of existence has left the loons with instinctive nesting patterns poorly adapted to existence in a world changed so recently by man. Until the pressures of civilization, the loss of a few nests from floods or predators was of no real consequence to the population as a whole. Now, human pressure on nests is the prime cause of the loon's population decline to the point it is a threatened species in New Hampshire. At present, there are about 300 adult loons in the state. About fifteen percent of the population is on Lake Winnepesaukee. Surviving chicks on the lake have varied in numbers from one in 1976 and 1981 to eleven in recent years. The loss of only a few nests, therefore, can be of major consequence to the population. Loons will return to the same nests despite adverse factors such as high water, subdivision construction next door,

repeated depredation, etc. They may reneest if earlier clutches are lost, but their chances of success become much poorer and clutch size usually declines from two to one. With all the pressures on the loon population at present, the USACE proposal to change the lake fill-up schedule so that water levels are still increasing in late May could have a severe negative impact on chick production on Lake Winnepesaukee.

In the last two years, the loons have used nests with elevations varying from lake level to 14½ inches above the water at the time of nesting, with a median height above water of only five inches. The 14½ inch height followed the flood--note that the previous year the same pair had been only 5 inches above water. Some examples of nest heights and lake levels are as follows:

Nest Location	Approximate Elevation of Nest Floor	Beginning of Incubation		
		Lake Level	Date	Elev. Above Lake
Little Mile I.	505.0'	504.39'	18 June 1983	8½"
" " "	"	504.67'	23 June 1984	3½"
Glines I. (nest A)	504.5'	504.58'	22 May 1984	0
Glines I. (nest B)	505.7'	505.49'	13 June 1984	3½"
Orchard Cove	504.6'	504.13'	5 July 1983	6"
Varney Is. (nest A)	504.7'	504.39'	18 June 1983	5"
Varney Is. (nest B)	505.8'	504.61'	24 June 1983	14½"
Spectacle I.	504.9'	504.33'	22 June 1983	7"
Melvin I.	505.0'	504.58'	1 June 1983	5"
Ambrose Cove I.	504.9'	504.58'	7 June 1983	3½"
" " "	"	504.55'	25 May 1984	4"

Due to flooding this year, many pairs nested late, and others did not nest at all. After a ten-year effort, we are finally seeing new pairs established, which we hope will nest early to avoid the tourists. The last two weeks of May and the first week of June is the prime nesting season. If the Corps' Spring fill-up rule curve is adopted, with June 1 as a target date for full pool, then many nests could be endangered or lost by a rise of only a few inches of water. The target date could not be later than May 7 to prevent nest losses, and I do not believe the present policy of aiming for a full pool is justified. Since the Corps' proposed dredging project, if realized, would still only allow a maximum drawdown of two inches a day (as opposed to the present inch a day), there would still be insufficient flood storage capacity in the lake. The lake rose a foot in four days this Spring despite record dam discharges and could rise five inches for each inch of runoff if the ground were saturated, according to the Water Resources Board. The only logical solution, short of a canal to the Atlantic (as was proposed in the fifties) to carry the runoff, is to lower the lake to provide flood storage capabilities. If the lake had been at only eight inches below full pool last May 29th (i.e. 503.6') rather than at 504.63' before six and a half inches of rain fell in five days, lake levels would have risen to only 504.89' rather than 505.89', avoiding almost all damage not only to loon nests but also to other parts of the environment including human structures. We still do not know the long-term biological effects of the flooding in terms of such factors as lake acidity and alkalinity, both severely affected during the flooding. I hope that your Environmental Impact Statement required under NEPA will take these factors into consideration, and that you will transmit these concerns to Colonel Sciple and other appropriate parties in the Corps.

Sincerely yours,

*Ralph Kirshner*  
Ralph Kirshner



# TOWN of SANBORNTON

SANBORNTON, NEW HAMPSHIRE

03269

September 26, 1984

Col. Carl B. Sciple  
Plan Formulation Branch  
U. S. Army Corps of Engineers NED  
NEDPL PF Bldg. 114-N  
242 Trapelo Road  
Waltham, Mass. 02254-9149

A meeting was held August 22, 1984 in Laconia, N. H. and another held September 19, 1984 regarding a proposed Flood Control Project. The purpose would be to dredge rivers and connectors between our lakes so that there would be a better control of water levels in case of floods. We also understand that this Flood Control project has been endorsed by the N. H. Water Resources Board and also Senator Gordon Humphrey.

It was explained that this project would cost in the vicinity of \$5,000,000.00 of which \$4,000,000.00 would be the Federal share and future taxpayers share for this project and \$1,000,000.00 would be coming from donations and the Taxpayers. In case that there would be an over-run this figure would have to be borne by the taxpayers.


We have many ways to control the water flowage to the Merrimack River and we feel if this is properly managed all the way down the stream we would have no flooding problems. It must be remembered that dredging is an ever-lasting project and we feel that this \$5,000,000.00 could be well spent more wisely in some other way to aid the Taxpayer of New Hampshire.

So, the Selectmen have unanimously voted to be opposed to this project and would so like to be recorded as such.

Sincerely,

Board of Selectmen, Sanbornton, New Hampshire

  
Richard E. Howe, Chairman

  
Pauline Sullivan

  
Thomas Salatiello

September 19, 1984

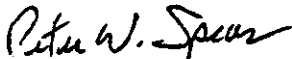
Colonel Carl B. Sciple, Division Engineer  
U.S. Army Corps of Engineers  
New England Division  
424 Trapelo Road  
Waltham, MA 02254

RE: Lake Winnepesaukee Regulation

Dear Col. Sciple:

I understand you have requested the New Hampshire Water Resources Board to hold a public hearing at the Tilton Town Hall this evening. I learned this yesterday from another source and am distressed about the issue. I asked in a letter to your project Manager, Mr. Goodrich, in early August, then again in person to both Mr. Goodrich and Mr. Ignazio on August 22<sup>nd</sup> that I be placed on a permanent mailing list to receive notices of your meetings, progress reports and the like. My public comments the evening of the 22<sup>nd</sup> largely regarded the unacceptable environmental impacts of the project. My comments also pertained to your staffs' organization in this matter, which continues to be ineffectual. Since I never received official word of your Tilton meeting I will be unable to attend same. I trust that this letter, in oppositon to both the lake level modification and the extensive dredging, rip-rapping and hinged gate construction will be placed in the public record of this project. Kindly see that I receive complete notice of future meetings well in advance of their scheduled dates.

Very truly yours,



Peter W. Spear, CWB, CEP  
167 South Street  
Concord, NH 03301

MR. VERN KNOWLTON  
SUMMIT WATER RESOURCES BB-  
CONCORD, N.H. 03301

RECEIVED

SEP 17 1984

NEW HAMPSHIRE  
WATER RESOURCES BOARD

Sir,

In regards to the dredging of  
the Winnepesaukee River from Franklin  
to Silver Lake.

I was unable to attend the  
meeting in Laconia, but am very  
much in favor of this project.

I have a home on Silver Lake  
and had up to 30 inches of water in  
my walk in basement during the  
flood.

Sincerely yours,  
Albert A. Sprague  
P.O. Box 232  
Lockneer, N.H.  
03252



# BRYANT & LAWRENCE, INC.

*Hardware*

Tilton, New Hampshire 03276

September 13, 1984

New Hampshire Water Resources Board  
37 Pleasant St  
Concord, NH  
Attn: Vern Knowlton

03301

**RECEIVED**


SEP 14 1984

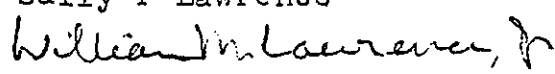
**NEW HAMPSHIRE  
WATER RESOURCES BOARD**

Dear Mr Knowlton:

We at Bryant & Lawrence Inc, located on the bank of the Winnepesaukee River in Tilton, would strongly urge you to take whatever measures necessary to prevent a recurrence of last Spring's flooding. Now, more that three months later, we are still cleaning debris from and drying out the basement.

Yours truly,

  
Sally P Lawrence

  
William M Lawrence Jr

Timothy & Valerie Brulotte  
P. O. Box 63  
Lochmere, NH 03252

RECEIVED Sept. 1984

SEP 12 1984

NEW HAMPSHIRE  
WATER RESOURCES BOARD

Dear Mr. Knowlton,

As we were unable to attend the recent town meeting to discuss the dredging of Silver Lake in Lochmere, we would like to express our feelings concerning this matter.

We have lived on Silver Lake for over two years and experienced the growing problem of our lakes inability to handle the amount of water being forced through Lochmere Dam. Each spring the water rises higher, until May 28<sup>th</sup> this year, when we were forced out of our home. The lake level crested to 18" within our first floor ranch and maintained that level for a week. Since our house is built on a cement slab, that water caused almost \$15,000.00 worth of damage to house and property. As of this letter, we are still not living in our house and are awaiting funds from our mortgage holder to repair the house to a livable condition. Selectman Maurice

RECEIVED

SEP 1 1984

WATER RESOURCES BOARD  
NEW HAMPSHIRE

Bowler of Tilton has witnessed our damage as have many other town officials. Still, the town does not want to correct the problem although is quick to accept ballooning property taxes from us as lakeshore residents. The benefit of living on the lake has turned into a hinderance for which we are going to be subjected to pay over and over again.

we write this letter from our temporary house on which we have paid rent for over three months, and feel outraged at a town that refuses to allow its residents to live with peace of mind.

we can not agree with those who believe this year to be a freak of nature. Each spring since 1982 we have seen the problem get progressively worse. In fact, we have seen high water in December of 1983 making us wonder if this would become a year round problem.

What is most disheartening is seeing

every bit of land you own submerged in water and know the town opposes a solution. Especially when the federal government and state are willing to finance the majority of the project.

If this letter doesn't draw the best picture of the problem, perhaps the enclosed photograph will. Thank you.

Sincerely,  
Val + Tim Brulotte

Encl.



June 1984

TOWN of TILTON  
CONSERVATION COMMISSION  
145 Main Street  
Tilton, NH 03276

September 10, 1984

Plan Formulation Branch  
U.S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254-9149

Dear Sirs:

Members of the Tilton Conservation Commission attended the Corps public meeting in Laconia on August 22, 1984, hoping to gain more information about the proposed flood control project for the Winnepesaukee River. We were disappointed. The meeting was woefully inadequate. The information presented was little more than a rehash of what had already been made available to us in the local newspapers and in the flyer announcing your public meeting.

The public meeting was clearly designed to present only the project action. The information that we and others need to properly make an informed judgment about the project-- the environmental effects, both short and long term,-- was and still is sadly lacking.

We believe that a project of this scope warrants an environmental impact statement. The environmental effects of the amount of dredging of the river, of redredging over time to "maintain the benefits of the project", of increased flowage discharged from the Lakeport dam and resulting impact to the entire channel, and of alteration to the channel and water levels are yet to be properly evaluated to our satisfaction.

Much of the proposed project -- a large amount of the dredging as well as the construction of a bascule dam -- will impact river in Tilton. There is much local interest and support for the river with the completion of the Winnepesaukee River Basin Sewer Project. Raw sewage no longer flows in the river behind Main Street. Fishing can now take place in areas which formerly were no better than open sewer. A questionnaire recently circulated by our Commission to townspeople indicated strong local support for preserving existing undeveloped river frontage in its natural state for outdoor recreation and wildlife.

Consequently, we share the concerns of the environmentalists who spoke at your public meeting. Like them, we felt frustrated. We had expected that your meeting would provide in depth answers to obvious



questions related to areas of environmental concern. It became apparent to us that you did not wish to provide those answers at your meeting. Your response of "it will take too much time to answer here, we'll get back to you in person" not only denied the entire group access to the answer, but also gave the impression that either you would not, or could not, answer the questions asked.

We hope you will consider the following comments in the planning and evaluation of this project:

1. We feel that the present policy of fall draw down and spring fill up as currently maintained by the NH Water Resources Board is in need of improvement. Whether the recommended changes proposed by the Corps will help remains to be seen, but they could not be any worse than the present policy.
2. We are opposed to the proposed increased discharges from the Lakeport dam.
3. The flood control plan fails to deal with the problem of Silver Lake, which as we all know is not a lake, but a wide place in the river. The river channel through Silver Lake has become increasingly shallow through time. In Tilton, one of the areas of greatest impact by flooding is Silver Lake.
4. We find it incredible that you ignore the adverse impact to the Lochmere National Register Archeological District by planning to dredge from the outflow of Lake Winnisquam to the hydro dam in Lochmere. This dredging will destroy the pre-1800's wing dam, the 1828 wooden Pearsons' dam, as well as portions of associated mill sites. The river bed is covered with artifacts representing the occupancy of this area, which date back to the earliest colonial settlement period, 1765. This dredging will, in effect, wipe out the mill district of the National Register District and destroy the integrity of the District. The only access to the river for dredging equipment is across exposed prehistoric site which has prehistoric components dating back at least 6000 or more years. These prehistoric sites may well extend into the river channel.
5. We are wondering how you are complying with federal laws regarding cultural resources. We have local reports of fish weirs located in the river channel south of Rte 140, which may be of either historic or prehistoric origin. The Archeological Survey of the Lakes Region (Hoornbeek, 1978)

notes prehistoric site in the vicinity of the location of the proposed bascule dam. Areas designated for dredging in other communities also have potential for industrial archeological remains in the river channel. We trust that you realize that no formal survey for archeological sites has ever been done in the Winnepesaukee River channel.

In addition, we have the following questions:

1. Can you demonstrate that this project is going to be equally beneficial to Lake Winnepesaukee residents and to communities downstream?
2. What impact will dredging have on stream dynamics and the equilibrium of the Winnepesaukee River and its tributaries?
3. Will this approach to solving flood problems only contribute to problems on tributaries or downstream on the Merrimack?
4. How will dredging behind Main Street in Tilton effect the foundations of the buildings perched on the riverbanks?
5. What effect will dredging have on the stability of the Island Park in Tilton? Its banks have already suffered considerable erosion from high water impacting.
6. What effect will dredging and increased flowage have on riverbank stability?
7. What effect will the project and redredging to maintain the project have on fish and other aquatic organisms?
8. How will sediment production be controlled during dredging?
9. How deep will material be removed?
10. Where will dredged material be disposed of? (Remember, the river has served as a trash and sewage disposal area for a couple centuries, especially in downtown Tilton. No one considers that section of river bottom to be particularly pristine.)
11. What effect will the project have on major wetland/wildlife areas, such as the Tioga swamp?
12. What effect will the project have on threatened species of flora which grow along the riverbanks?

We urge that the above questions be properly addressed in an environmental impact statement.

Sincerely yours,

The Tilton Conservation Commission

Ronald P. Mills, Sr., Chairman

*Ronald P. Mills*  
Justine B Gengras, Asst. Chairman

*Justine B. Gengras*

Randy Ferrin

*Randy Ferrin*

Charles Mitchell

*Charles Mitchell*

Robert Hardy, Jr.

*Robert Hardy*

cc:NH Water Resources Board

NH Wetlands Board

State Historic Preservation Officer

Mr. Wallace Stickney, Governor's Office

Hon. Barbara Bowler, N.H. Representative

Hon. Norman D'Amours, U.S Representative

Office of the Secretary, U.S Dept. of the Interior

U.S. Department of the Interior

#1 RIVERSIDE

TILTON, N.H. 03276

5 September 1984

Gentlemen

The concern I have for the dredging plan for the Wenepesaukee River project is rather personal because we own 2300 ft of riverbank between I-93 downstream to the railroad bridge above the old dam.

I have lived on this river all my life and remember the great floods from 1936 on. But have never seen water stay as high for so long a period as has been in the last few years since the so called development of a Hydro dam downstream. This project has filled in about 2/5 of the old mill pond and has constricted the flow of water so that my property is affected during all high water periods not just abnormal ones.

During the past twenty years the progress from developing Two Silt & Grave pits, sewer projects, and I-93 building and repair of bridges upstream has resulted in a good build-up of siltation.

(2)

on the river bottom. So I truly believe that your dredging process is the way to go. But your present plans do not contain any dredging along my property. There is a large concentration of rock-ledge below I-93 that would prohibit any excavation there, but below that to the Island in Tilton would be possible.

Over the years the mills, homes, and the railroad used the riverbanks for dumps of metal, glass, telegraph wire coils and whatever. If in the dredging process these banks of trash could be covered that would enhance the beauty of the riverbanks as well as making it safe for the children and animals.

I have in my possession a flowage map drawn in the 1800's on linen that shows the contour and the old dam. I believe if the river was put back to the contour of what it was then it will eliminate much of my high water problem.

(3)

Enclose find picture of my summer house in recent years #1 is normal spring high (which never used to come that high even in the spring) and #2 during the recent heavy rains in early 1984

The snap I mentioned is available to see or reproduced if you want to I am available at anytime to speak to anyone concerning this letter. I work for the US Postal Service and am also a Selectman in the Town of Tuton.

This letter reflects my views and opinions and are not necessarily those of the Town

Sincerely

William W. Joseph



3 FT over NORMAL  
SPRING HIGH

Andrew J. D'Angelo  
Box 124  
Winnisquam, N.H. 03289

8/22/84

Col. Carl B. Sciple  
Plan Formulation Branch  
U.S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Rd.  
Waltham, Mass. 02254-9149.

Dear Col. Sciple:

The Winnepesaukee River Basin Proposed Flood Control Project endorsed by the N.H. Water Resources Board and Senator Gordon Humphrey, which was put forth by your spokesmen at the public meeting held in Laconia on 8/22/84 was at best a poorly prepared presentation or at worst an election year political scam as charged by Rep. Eugene Daniell.

You forecast a \$5 million cost for a project that expert witnesses doubt will be effective. Those same witnesses expressed concern over the resulting ecological and environmental damage.

Your nostrum was laced with quackery when under questioning you revealed that the federal share of the cost is limited to \$4 million and the "non federal" share is \$1 million, but should there be a cost over-run, the extra money would have to come from the "non federal" funders. Alas, you could not identify the "non federal" payers. Further, you could not produce a foundation for your projection that this area would enjoy an annual benefit of \$3 million by embracing your proposition.

Your slide presentation ended with a sustained pleasant view of a triple conduit by-pass in a setting of pure white rocks. Only after your speaker finished talking about our local problems did he identify the slide as a sample of your accomplishment in another state. Sort of like the hustler that's trying to sell you a piece of Florida swamp while showing a picture of a palm tree lined golf course.

All your rhetoric addressed the symptoms and accepted the cause as an untouchable. Rain is an inevitable, uncontrollable phenomenon. The Winnepesaukee lake level is controllable. Instead of allowing



page 2, basin project, 8/26/84

the recreational interests to dictate that the lake level must be at full pool, 504.3' elevation on June 1, the Water Resources Board should limit the lake level at 503.3 elevation until the latter part of June, and cease catering to selfish special interest groups.

This cost free action, coupled with a spring clean up of the downstream dams by the responsible parties, be they private owners or the Water Resources Board, would have prevented most of the river basin damage of the 1984 flood.

A 503.3' elevation until late June would inconvenience mostly those that own or want to sell deep draft Leviathans.

Your panacea would benefit those deep draft devotees, the owners or developers of shore front property you would create or improve, and the private operators of dams that would be improved with our money.

The losers would be the environment and us, the payers of both the federal and non-federal cost of your project.

There was a not so subtle hint that your head table will be back for another attempt to convert us skeptics. Spare the taxpayers money. These fish are not biting.

Sincerely yours,

  
Andrew J. D'Angelo  
Sanbornton

copy: NHWRB  
Press  
Selectmen



NEW HAMPSHIRE ASSOCIATION OF CONSERVATION COMMISSIONS  
54 PORTSMOUTH STREET, CONCORD, NH 03301 224-7867

August 24, 1984

Plan Formulation Branch  
US Army Corps of Engineers - NED  
NEDPL - PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, MA 02254 - 9149

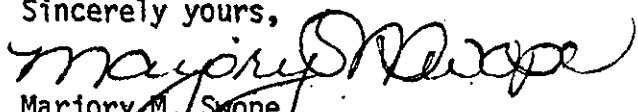
RE: Proposed Winnepesaukee River Basin  
Flood Control Project

Dear Sirs:

I was unable to attend the meeting in Laconia on August 22 on the Proposed Local Flood Control Project for the Winnepesaukee River Basin but would like to express my concern about the structural portion of the project. Recent newspaper articles have described a Corps of Engineers project in Florida to restore, at great expense, to its natural condition a river which was dredged and straightened in part to control flooding. Since the Winnepesaukee River project was conceived at about the same time, is this extensive dredging the appropriate solution to periodic flooding in 1984?

In light of the expense of the project, the wisest approach would appear to be implementation of changes in the regulation of the water levels in Lake Winnepesaukee. A subsequent evaluation of the altered situation might reveal whether the extensive dredging is needed and cost-effective.

Sincerely yours,

  
Marjory M. Swope  
Executive Director

MMS/m

Box 220B, R.F.D. #1  
Laconia, NH 03246

24 August 1984

Plan Formulation Branch  
U. S. Army Corps of Engineers-NED  
NEDPL-PF, Bldg. 114-N  
424 Trapelo Road  
Waltham, Massachusetts 02254-9149

Gentlemen:

I attended the public meeting concerning the Winnepesaukee River Basin Proposed Flood Control Project, but was unable to comment because of a personal time limit.

The project team did a good job in identifying lake level controls to reduce the probability of Lake Winnepesaukee rising to objectionable levels. The New Hampshire Resources Board should implement these recommendations without delay. Modification of the spring fill up regimen, (i.e. full pool by June 15 instead of June 1) will provide even greater safety without affecting recreational interests.

I am opposed to the portion of the project which involves channel improvements in the Winnepesaukee River. The project team did not demonstrate a need, commensurate with the proposed 5 million dollar cost. Unfortunately, there was every indication that the need issue was distorted by the project team in an effort to "sell" the project to the local community. Comments from the floor by State Representative Barbara Bowler cited that the flooding during 1984 in Belknap and Merrimack Counties was not sufficiently serious to even qualify the Counties for Federal disaster relief. The project team, however, interpreted the 1984 flood as a significant disaster involving many millions of dollars of loss and consequently, a prime argument for funding the project. Somebody is in error: As a resident of the Lakes Region, I assure you that it is the project team.

This project should be dropped immediately so that no further Federal expenses will be incurred by the Corps of Engineers. I emphasize this because local radio reports after the hearing quoted the project team as saying the public "misunderstood the issue". The "public" understood all too well that what was being proposed was pure "pork barrel", a waste of Federal funds, and wanted none of it.

Very truly yours,

  
Donald P. Foudriat

cc: Laconia Evening Citizen  
Sen. G. Humphrey  
Sen. W. Rudman  
Cong. N. E. D'Amours

Richard J. Tichko  
28-B Rolfe Street  
Penacook, NH 03303

August 23, 1984

Col Carl B. Sciple  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, MA 02254

Dear Col. Sciple:

We, the undersigned, oppose the proposed channelization of the Winnepesaukee River (from Silver Lake to Rte. 140) on the following counts:

Having fished, hunted, swam, boated and bird-watched along this water course since 1971, we feel that we are familiar with this resource during the four seasons. Therefore, we are able to make an accurate statement regarding its contribution to the wildlife, the surrounding land as well as the people who live around it.

1. This area is one of the few areas where waterfowl can winter over. The flow of the water through this area is such that it remains ice free, allowing the waterfowl to rest and feed during the adverse weather situations.

2. The abundance of wildlife is evidenced by our sightings of Mallard, Blacks, Blue and Green Wing Teal, Golden Eyes, Buffel Heads, Hooded Mergansers, Common Mergansers, Wood Ducks, Canada Geese, Kill Deer, Wilson Snipe, Great Blue Herons, Green Herons, Ospreys, White-tailed Deer, Muskrats, Beaver, and Red and Grey Squirrels.

3. Man's non-consumptive use of the river through the years are as follows: swimming, boating, canoeing, birdwatching and tubing.

4. Man's consumptive uses have been: fishing, hunting and trapping.

5. The river is part of a large upland marsh system, that if channelized and reflooded, would drastically change the complection of the area and what it now harbors.

In summary, we will not support any channelization project when the costs far exceed any benefits derived. We hope that in your investigation of this project, you will come to realize that this area is environmentally richer because of the Winnepesaukee River and not in spite of it.

Petition enclosed

AUG 30 1984

- ① Richard J. Tichko
- ② Patricia Procter
- ③ Edward E. Jones
- ④ In Summary
- ⑤ Douglas E. Grant
- ⑥ Duncan McInnes
- ⑦ Sandra C. Dunlop
- ⑧ Elizabeth B. O'Leary
- ⑨ Jessie L. Tichko
- ⑩ Beverly A. Helaine

Mr. David Goodrich  
Project Manager  
Winnepesaukee River Flood  
Control Study  
Dept. of the Army  
Corps of Engineers  
New England Division  
424 Trapelo Road  
Waltham, MA 02154

RE: Dredging, Filling and Channelization of the Winnepesaukee River

August 12, 1984

Dear Mr. Goodrich,

I want to voice my complete disapproval of the proposed flood control activities of the Corps of Engineers on the Winnepesaukee River from Laconia to Franklin, NH. This type of work is wasteful of government funds and recklessly squanders an excellent aquatic resource.

I am familiar with the entire reach in question and use it extensively for boating, canoeing, hunting and fishing. The area is quality habitat for numerous outdoor water contact activities and should be protected from further man-induced change.

Flood control activities are, in my opinion; and always have been a boondoggle. They simply help keep you people in business. They are not cost-effective in the near or long term analysis.

Several years ago I voiced my disapproval to a similar proposal from your organization in writing. At that time I requested to be placed on a mailing list for any further documents which might be issued from your organization regarding same. I was not notified of the July 18, 1984 informational meeting that you held in Laconia, NH. Had I know I certainly would have attended and voiced these opinions to you. I want these ideas to be placed in the official record of this project and I want to be appraised of further developments in your planning, including additional meetings, draft reports etc.

To conclude, if you have not got the message: I oppose this project for economic and environmental reasons.

Very truly yours,

*Peter W. Spear*  
Peter W. Spear, Cert. Environmental Planner, Cert. Wildlife Biologist  
167 South St.  
Concord, NH 03301



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P.O. BOX 1518  
CONCORD, NEW HAMPSHIRE 03301

Colonel Carl B. Sciple  
Division Engineer  
New England Division  
U.S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254

APR 20 1983

Dear Colonel Sciple:

This responds to the April 8, 1983, request from your staff for information on the presence of Federally listed and proposed endangered or threatened species in the study area for the proposed Winnepesaukee River flood control project in Belknap and Merrimack Counties, New Hampshire.

Our review shows that except for occasional transient individuals, no Federally listed or proposed species under our jurisdiction are known to exist in the project impact areas. Therefore, no Biological Assessment or further consultation is required with us under Section 7 of the Endangered Species Act. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address other legislation or our concerns under the Fish and Wildlife Coordination Act.

A list of Federally designated endangered and threatened species in New Hampshire is enclosed for your information. Thank you for your cooperation and please contact us if we can be of further assistance.

Sincerely yours,

Gordon E. Beckett  
Supervisor

Enclosure



FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES  
IN NEW HAMPSHIRE

Common Name	Scientific Name	Status	Distribution
<u>FISHES:</u>			
Sturgeon, shortnose*	<u>Acipenser brevirostrum</u>	E	Atlantic Coastal waters
<u>REPTILES:</u>			
Turtle, leatherback*	<u>Dermochelys coriacea</u>	E	Oceanic summer resident
Turtle, loggerhead*	<u>Caretta caretta</u>	T	Oceanic summer resident
Turtle, Atlantic ridley*	<u>Lepidochelys kempii</u>	E	Oceanic summer resident
<u>BIRDS:</u>			
Eagle, bald	<u>Haliaeetus leucocephalus</u>	E	Entire state - migratory
Falcon, American peregrine	<u>Falco peregrinus anatum</u>	E	Entire state - re-establishment to former breeding range in progress
Falcon, Arctic peregrine	<u>Falco peregrinus tundrius</u>	E	Entire state Migratory - no nesting
<u>MAMMALS:</u>			
Cougar, eastern	<u>Felis concolor cougar</u>	E	Entire state - may be extinct
Whale, blue*	<u>Balaenoptera musculus</u>	E	Oceanic
Whale, finback*	<u>Balaenoptera physalus</u>	E	Oceanic
Whale, humpback*	<u>Megaptera novaeangliae</u>	E	Oceanic
Whale, right*	<u>Eubalaena spp. (all species)</u>	E	Oceanic
Whale, sei*	<u>Balaenoptera borealis</u>	E	Oceanic
Whale, sperm*	<u>Physeter catodon</u>	E	Oceanic
<u>MOLLUSKS:</u>			
NONE			
<u>PLANTS:</u>			
Robbins cinquefoil	<u>Potentilla robbinsiana</u>	E	Coos County
Small Whorled Pogonia	<u>Isotria meleoloides</u>	E	Belknap, Strafford, Merrimack, Grafton, Carroll, Rockingham Counties

\* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service

Rev. 11/1/82



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P.O. BOX 1518  
CONCORD, NEW HAMPSHIRE 03301

Colonel Carl B. Sciple  
Division Engineer  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254

JAN 27 1983

Dear Colonel Sciple:

This Planning Aid Letter supersedes our letter of June 9, 1981, and is intended to aid your study planning efforts for the development of flood control measures on the Winnepesaukee River, Belknap and Merrimack Counties, New Hampshire. It has been prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

We understand that measures for reducing flood damages on the Winnepesaukee River include structural and non-structural alternatives. The proposed structural measures for the five (5) identified damage reaches are as follows:

## Reach 1, Franklin

### A. Modifications to existing dams--

Franklin Falls Hydro Dam #2; open center gate to 11 feet

Public Service Company Dam; abandoned and partially breached, remove dam or modify structure to safely pass flood flows (pending FERC application)

J.P. Stevens Dam; lower crest of dam and add flashboards (pending FERC application)

### B. Remove silt deposits directly under Central Street Bridge (Daniell Bridge).

## Reach 2, Tilton/Northfield

### A. Tilton dam; replace existing dam with lower crest.

### B. Improve Boston and Maine railroad bridge below Park Street to prevent blockage by debris during flood flows.

### C. Deepen and widen river channel between the two Boston and Maine railroad bridges, a distance of 2,300 feet.

## Reach 3, Silver Lake

### A. Deepen and widen 2,700 feet of river channel downstream of Route 140 bridge.

#### Reach 4, Laconia

- A. Deepen and widen 2,900 feet of river channel from Fair Street Bridge to base of Avery Dam.
- B. Deepen 2,700 feet of river channel from Avery Dam upstream to Messer Street Bridge.

#### Reach 5, Lakeport (above Lakeport Dam)

- A. Widen the Gold Street trestle bridge and channel.
- B. Deepen and widen 900 feet of channel between the U.S.G.S. gage and Boston and Maine railroad bridge.

In addition, we understand that non-structural measures such as flood-proofing are being considered for Reaches 2, 3, and 4, Tilton/Northfield, Silver Lake, and Laconia, respectively.

Modification of the three dams in the Franklin area and removal of silt deposits under the Daniell Bridge would have no significant adverse impacts upon fish and wildlife resources. However, there would be temporary minor adverse impacts associated with disturbance and turbidity during the construction period.

Replacing Tilton Dam with a concrete weir at a lower crest elevation than the existing dam and improvements to the railroad bridge below Park Street would have only minor adverse impacts upon fish and wildlife resources. These minor impacts would be associated with disturbance and turbidity during the construction period and would be temporary in nature.

The 2,300 feet of river that is proposed to be deepened and widened in the Tilton/Northfield area is stocked with trout and supports an excellent smallmouth bass population. Dredging could have a significant adverse impact upon these fishery resources by reducing food and cover and changing flow characteristics and current velocities throughout the reach. The extent of these adverse impacts would depend upon what degree the river bottom could be restored to its original condition and the resulting change in flow characteristics and current velocities after channel dredging. However, we believe that improvements to the Tilton Dam and the railroad bridge below Park Street coupled with non-structural measures could eliminate or significantly reduce the need for dredging in this area. This aspect should be thoroughly reviewed during project investigation.

Deepening and widening 2,700 feet of river channel downstream of Route 140 could have significant adverse impacts upon fish and wildlife resources. Fishery resources are similar and would be impacted in the same manner as those of the Tilton/Northfield area. The Tioga River wetland upstream of Route 140, near Silver Lake, is important as a nesting, feeding and resting area for waterfowl such as black ducks, mallards and wood ducks. In addition, it provides valuable habitat for muskrats, mink, raccoon, beaver, white-tailed deer and a large variety of song birds. A reduction in the water levels of this wetland, due to dredging below Route 140, would adversely impact the overall productivity of this area and could significantly reduce

the area of wetland. In view of the importance of the Tioga River wetland and the fishery resources of the Winnepesaukee River, we recommend that dredging below Route 140 be dropped from further consideration and that the non-structural alternatives be implemented for the Silver Lake area. In addition, we recommend that the Tioga River wetland be thoroughly investigated for inclusion in the overall flood control program as a natural valley storage area.

The 2,900 feet of river channel proposed for dredging downstream of Avery Dam in Laconia is stocked with trout and provides spawning habitat for both landlocked salmon and American smelt. Dredging this stream reach would adversely impact fishery resources by reducing food and cover, disrupting or destroying spawning habitat, and changing flow characteristics and current velocities. In addition, Eager Island, a wetland area, could be adversely impacted if dredging resulted in a lowering of water levels. While loss of stream habitat could be mitigated to some degree by restoring the river bottom to its original condition, we urge you to thoroughly investigate non-structural measures for this reach in order to eliminate or significantly reduce the need for dredging.

The proposed dredging upstream of Avery Dam and upstream of Lakeport Dam in Paugus Bay would have minor adverse impacts upon fish and wildlife resources. These minor impacts would be associated with disturbance and turbidity during the construction period and would be temporary in nature.

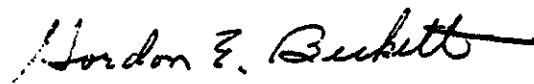
During a reconnaissance survey on December 21, 1982, we noted a large stone crib in Paugus Bay near the Elm Street Bridge. If this stone crib is to be removed we suggest that the stones be utilized to improve fish habitat in Paugus Bay. The New Hampshire Fish and Game Department and this Service would be pleased to assist in locating an appropriate area for disposal of these stones.

In order to minimize the impacts of disturbance and turbidity associated with construction activities we recommend that such work be conducted during the period of June 1 to September 15. In addition, we recommend that in the areas to be dredged, the river bottom be restored as near as possible to its original condition in order to mitigate the loss of fish habitat.

To more accurately assess the impacts of this proposed project the following information will need to be developed during the flood control planning process: (1) an analysis of project induced changes in flow characteristics, current velocities and water levels, (2) an analysis of bottom sediments for potential toxic substances, and (3) the location of potential disposal areas for dredged material.

We would be pleased to assist you in the various stages of project planning, and we will report on the potential impacts of your selected plan.

Sincerely yours,



Gordon E. Beckett  
Supervisor



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P.O. Box 1518  
Concord, New Hampshire 03301

Colonel William E. Hodgson  
Deputy Division Engineer  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254

JUN 9 1981

Dear Colonel Hodgson:

This letter is intended to aid you in your planning for the Winnepesaukee River, New Hampshire, flood control study, and results from a joint field trip with members of your staff followed by a Memo for the Record by Mr. Cleveland.

We agree that the proposed work to be done in Damage Reaches #1, #2, #3, #5, and #6 should cause only minor adverse impacts if no unforeseen problems arise and if the work is completed as described. The minor impacts would be the temporary disturbance and resulting turbidity in sections to be dredged. We agree that there are no apparent significant adverse impacts, however, we will need your estimates of changes in flow, if any, resulting from the work. The use of "no adverse impact" in the memo should be changed to "minor adverse impacts consisting of temporary siltation and disturbance."

We will need to continue further investigations in Damage Reach #4 where the channel will be dredged at Eager Island, a wetland. Small wetland sites along the river are useful to the many ducks, mostly mallards, that use the river and to fingerling fish. They also add aesthetic quality for local people. We are placing this area in Resource Category 3. 1/ There should be some way to achieve flood control and preserve this wetland at the same time. One possible solution to the flood problem might be to deepen the channel on each side of the Island.

Possible impacts on the project area mentioned in Section "g" of the memo are of concern to us. The proposed work could have adverse effects on the stream if existing rapids sections are changed to featureless chutes by dredging. In addition, the Tioga River wetland, also Resource Category 3, could be adversely impacted by the channel work and bascule gate and resulting inundation of wetlands along the river. We plan to continue work on these areas in cooperation with your staff.

Sincerely yours,

Gordon E. Beckett  
Supervisor

1/ Section V(B), U.S. Fish and Wildlife Mitigation Policy, Federal Register, Vol. 46, No. 15, January 23, 1981, pp. 7644-7663.

STATE OF NEW HAMPSHIRE



FISH AND GAME DEPARTMENT

CHARLES E. BARRY  
EXECUTIVE DIRECTOR

Box 2003  
34 Bridge Street  
Concord, N.H. 03301  
(603) 271-3421

May 26, 1981

Colonel William E. Hodgson  
Deputy Div. Engineer  
N.E. Div. Corps of Engineer  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Colonel Hodgson:

On April 22, 1981 I met with Dennis Waskiewicz, Doug Cleveland, Sue Brown and Marcia West of your office and Win Robinson of the U.S. Fish and Wildlife Service to evaluate in the field, potential impacts to fish and wildlife and their habitats from the proposed flood control measures in the Winnepesaukee River basin.

In regards to the Memo for the Record by Doug Cleveland which states that no adverse impacts will occur from some of the proposals, I question whether anyone could make such an appraisal. Even though we concurred that some of the proposed alternatives would not disrupt a great deal of fish and wildlife and their habitats, if done properly, to say it would have no adverse impact is presumptuous.

In regards to the particular Damage Reaches #1 thru #6 we more appropriately concurred that the proposed preliminary alternatives, if carried out properly and at a time of the year which would have the least affect on resident and migratory fish and wildlife, would have the least impact.

The proposals for the stretch of river below and above Route 140 which calls for extensive dredging would have a negative impact on fish and wildlife. The Bascule gate would inundate a wetland area which is presently an important nesting, feeding, and resting area for several species of waterfowl. Dredging below Route 140 would reduce cover for fish species such as smallmouth bass and brown trout. No mention is made of flood storage and associated lake level fluctuations of Lakes Winnepesaukee and/or Winnisquam.

I recommend that if the alternatives are justified the proposals for Damage Reaches #1 thru 6 be undertaken and the proposals for the sections of the river above and below the Route 140 bridge be dropped from further consideration.

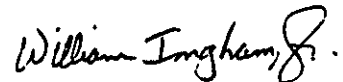
Colonel William E. Hodgson

page 2

May 26, 1981

My remarks were made in accordance with the Fish and Wildlife  
Coordination Act (48 stat. 401, as amended 16 U.S.C. 661 et. seq.).

Sincerely yours,

A handwritten signature in cursive script that reads "William Ingham, Jr." with a stylized flourish at the end.

William C. Ingham, Jr.,  
Fisheries Biologist and  
Planner

WCI/nkc



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P.O. Box 1518  
Concord, New Hampshire 03301

SEP 12 1980

Colonel William E. Hodgson  
Deputy Division Engineer  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Colonel Hodgson:

This letter is intended to aid in your study of flood control measures for the Winnepesaukee River, New Hampshire. It is submitted under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This letter supplements our letters of February 6, 1973, and December 20, 1978.

The importance of the Winnepesaukee River and the tributary lakes to fish and wildlife resources is of considerable magnitude. Planning and/or studies for flood control measures should consider this important resource and develop alternatives to minimize the adverse impacts. The river has a viable aquatic community and the lakes support important fishing and wildlife resources. These resources are important to the economy of the central New Hampshire area.

Development of hydroelectric power in New England has resulted in new interest in the Winnepesaukee River. Current proposals include the Franklin Falls Project (FERC #3093), Franklin Development Project (FERC #3118 and #3170), Lochmere Project (FERC #3128 and 2982), Cotton Mill Project (FERC #3221), and Clement Dam Project (FERC #2966). All these projects will have varying degrees of impact upon the aquatic resources. Minimizing adverse impacts that might result from interactions between flood control measures and hydro development should be considered during your investigation.

Restoration of anadromous fish to the Merrimack River Basin is being planned and implemented under the general direction of the Policy Committee for Anadromous Fishery Management. Restoration of anadromous fish to the Winnepesaukee River is included for the basin. Our report during your Stage 2 planning will provide more details as to the anadromous fish restoration possibilities. Probably the most immediate and important



function of the Winnepesaukee River is providing flows to the main stem. The lakes in this tributary system also provide flow stabilization and some storage not available from the Pemigewasset Basin.

Lake trout is a major fish species in the Winnepesaukee and Winnisquam Lakes. They spawn for a brief period during the last part of ~~September~~<sup>October</sup> and the first part of ~~October~~<sup>November</sup> on rocky reefs that may be only one foot deep. The eggs hatch in late winter and early spring and the young leave the reef by early June. Any reduction of water level that exposes the reefs during this period could cause the loss of eggs or young. The New Hampshire Fish and Game Department is continuing its work on locating and characterizing the spawning reefs.

corrected  
by M. J. J.  
Robinson  
by T. L. L.  
on 9-19-51

The common loon and many other waterfowl are also dependent on stable water levels during the spring nesting season. The loon is receiving attention as a declining species. We will investigate the relationship between proposed water level management and requirements of these species.

Sincerely yours,

*Gordon E. Beckett*

Gordon E. Beckett  
Supervisor



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
John W. McCormack Post Office and Courthouse  
BOSTON, MASSACHUSETTS 02109

FEB 6 1973

Division Engineer  
New England Division  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Sir:

This is our preliminary report concerning the fish and wildlife resources associated with the Winnepesaukee River Watershed, Belknap and Merrimack Counties, New Hampshire. This report is in reference to your possible study of flood damage reduction and other water resource purposes. The study would be conducted under authority of a resolution adopted by the U. S. House of Representatives Committee on Public Works, July 14, 1970. This report was prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), in cooperation with the New Hampshire Fish and Game Department. Their letter of concurrence was received on January 11, 1973 and is attached.

The Winnepesaukee Watershed has a drainage area of 486 square miles which includes several New Hampshire towns and a permanent population exceeding 50,000 people. The area is a very popular summer recreation area and provides opportunities for many outdoor activities, including swimming, boating and fishing. Lake Winnepesaukee is the largest body of water in the drainage area, and is connected with Wentworth, Paugus, Opechee and Winnisquam Lakes. These lakes have historically provided natural storage reservoirs for the watershed. Currently there are several dams located along the river which influence lake levels. Major existing structures include (1) the Lakeport dam, which controls the level of Lake Winnepesaukee and Paugus Bay; (2) Avery dam, which controls the level in Opechee Lake, and (3) Lochmere dam, which controls Lake Winnisquam. We understand there are at least six non-working dams in the Franklin-Tilton area and many other dilapidated structures in the watercourse.

The entire Lakes Region is considered one of the most outstanding recreational areas in New England. Fishing pressure is heavy throughout the watershed and many hours are spent angling for trout, landlocked salmon, bass, white perch and pickerel.

The Winnepesaukee River contains very significant fishery resources. American shad have historically used this river for spawning activities. Dams and other obstructions have eliminated migrations of this fish, but the installation of fishways will facilitate passage and utilization of available habitat.

Rainbow trout are stocked in the reach from Silver Lake down to the town of Tilton and an excellent fishery has developed. Salmon are taken frequently in the section of the river at Silver Lake, the confluence of Winnisquam Lake, and upstream into Laconia. An excellent fishery for smallmouth bass exists in the slower reaches of the river.

The high amount of urbanization around the lakes and along the river precludes the existence of many game species in the immediate study area. The watershed is heavily utilized by waterfowl due to the abundance of resting and feeding sites, especially the slower reaches of the channel and backwater areas of the river. These areas also supply habitat for muskrat, mink, beaver and otter. Duck hunting is very good along certain reaches of the river but is limited by urbanization and lack of public access.

Due to heavy urbanization we can anticipate a project plan including channelization, diking and some flood control structures. Modification of the existing stream habitat could prove detrimental to existing fishery resources in the Winnepesaukee River. Preservation and enhancement of these fisheries must receive precedence in project formulation.

Alternate proposals which should be studied in order to protect the fishery habitat include: floodplain management programs, acquisition and establishment of floodways and environmental corridors, levee systems, bypass systems, and selective snagging and clearing. If the aforementioned alternatives are not found feasible, maximum consideration should be given to excavation from one side of the river only, which would require careful design and excavation only on the stream meanders and not in a straight line. Any channel work must also include the installation of sills under the water to facilitate the creation of pools and riffles in the channel area. Any project work resulting in loss of fish habitat should be avoided or the loss replaced.

Some of the existing dams in the river are in poor condition and will present hazards to future anadromous fish migrations. Obsolete dams should be removed and the remaining and proposed structures be provided with suitable fishways to facilitate fish movement. The removal of these dams could allow faster movement of the water downstream and may negate the need for channel work.

Fluctuating water levels in Lake Winnepesaukee may have a detrimental effect on the spawning activity of resident fish species. Stable levels must be maintained from October 15 to March 1 to insure that adequate spawning habitat will be available for reproduction.

Industrial and municipal pollution is a major problem in the watershed, especially in the Winnepesaukee River below Tilton. The amounts of municipal sewage and runoff from roofs, roads, parking lots and industrial wastes preclude the optimum use of existing fishery resources within the river and may inhibit shad migrations in the future. This pollution also presents a hazard to the health and well-being of the citizens downstream. Reduction of urban run-off by temporary storage should be studied and presented to the citizens as a prerequisite to and possible aid in reducing flood water damage. Protection must be given to all marshy or wetland areas within the boundaries of the study. These areas are invaluable as natural water storage reservoirs and provide habitat for numerous species of waterfowl and other wildlife resources. Any channel work around these areas must be carefully planned to avoid acceleration of the natural drainage or degradation of the existing natural resources of these areas. Immediate seeding of any proposed dikes and installation of silt traps in the stream during project construction would be necessary to prevent serious damage to aquatic resources including anadromous fisheries. Land acquisition for public access to the stream banks along the project area should be incorporated into project plans.

All facets of this study affecting fish and wildlife resources must be coordinated with the New Hampshire Fish and Game Department in order to facilitate the promotion of these resources and minimize losses.

For your guidance in considering the environmental impact should a project be formulated we offer the following comments with respect to Sec. 102(2)(c) of the National Environmental Policy Act of 1969.

### Environmental Setting Without the Project

The Winnepesaukee River Watershed encompasses about 311,000 acres, of which more than 25% is water. The area is one of the top recreation areas in New England affording opportunities in many outdoor activities. Many species of songbirds as well as upland game, furbearers, big game and waterfowl are present in the watershed. The lakes and rivers abound in trout, salmon and several species of warm-water fish which furnish hours of recreation for the angler.

### Environmental Impact of the Proposed Action

Any modification of existing stream habitat will have a severe impact on the fishery resources of the river. Drainage or modification of wetland areas associated with the river could have a serious affect on usage by waterfowl or furbearers and other natural resources of these areas. Elimination of the non-working dams in the river will have a beneficial impact of facilitating fish movement upstream.

### Alternatives to the Proposed Action

- (a) No project.
- (b) Pollution abatement including runoff retarding facilities and elimination of non-working dams.
- (c) Floodplain zoning and movement of people and businesses out of the floodplain.

In the course of your planning and coordination with the New Hampshire Fish and Game Department and Federal agencies, we recommend that--

1. In connection with any stream modification project, consideration be given to public acquisition of land for fish and wildlife development and management, and public access.
2. Consideration be given to providing unrestricted passage for anadromous fish in the Winnepesaukee River, and removal of non-functioning control structures.
3. Channel modification (if required) be limited and designed to prevent dewatering or degrading of marshes and backwater areas and their related resources.
4. Channel or bank alterations (if required) be conducted on only one side of the stream.

5. Consideration be given to immediate revegetation of dikes and any disturbed areas associated with the project.
6. Consideration be given to pollution abatement, including municipal sewage and urban runoff as a means of enhancing fishery resources.

We appreciate the opportunity to report on this proposed study and request early notification of any project which might be planned as a result of your investigation. This will provide ample time to take full advantage of opportunities to develop fish and wildlife resources in relation to the project.

Sincerely yours,



ACTING Regional Director

Attachment